THE IRON TRADE REVIEW

VOLUME XXX. CLEVELAND, O. NOVEMBER 11, 1897. CHICAGO, ILL. NUMBER 45

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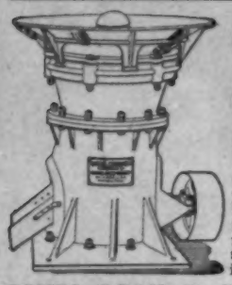

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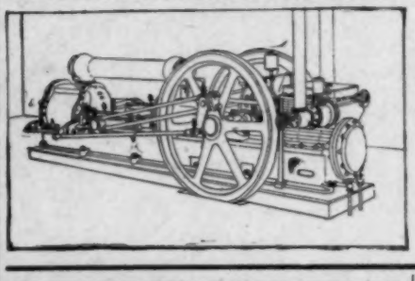

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THE IRON TRADE REVIEW

VOLUME XXX. CLEVELAND, O. NOVEMBER 11, 1897. CHICAGO, ILL. NUMBER 45

THE WEEK IN IRON CIRCLES.

Signs appear in the iron trade, of a desire on the part of both buyers and sellers to do business for 1898 to a greater extent than has been possible in the past month or two. The greatly increased buying capacity of the people is seen in the steadily maintained demand in ultimate lines of consumption, and as week follows week manufacturers are coming to the point at which they must know what their cost is to be in the first half of the new year. For the moment the situation is more favorable to the buyer than was the case a month ago. In the Eastern market pig iron for 1898 delivery can be had without paying the advances over current prices for prompt iron, that were asked in the middle of October, and some sellers are making more effort to get business. In the Central West, prices on 1897 and 1898 iron have approximated, and in the case of Bessemer pig iron both have declined somewhat, in November transactions, from the nominal basis of the latter part of October. Pittsburg, Cleveland, Youngstown and Lorain, O., have contributed to activity in Bessemer pig in the past week, and $9.65 valley furnace has been reached for 1897 deliveries. Some of the business has extended into 1898 on a basis of $9.90 for January and February and $10.10 for the first three months. The 50,000 tons of speculative iron that has made more or less commotion in the past few weeks is now practically all in consumers' hands. Furnaces in the Central West are quite well sold for 1897 delivery, on Bessemer iron, but it is not so sure that the requirements of consumers have been met. Yet in some lines the output of finished product promises to lessen in the next month, which fact, together with the large current furnace output, has made it possible for the buyers of the past week to pick up lots of iron at advantageous prices and preserved a steady market. Comparatively little business in Bessemer is closed as yet for 1898. Buyers' offers for the first three or four months are on a basis of $9.90 to $10. Steel billets are weaker, in part the result of resales, as it now appears there were some cases of overbuying as well as of overselling. For deliveries extending into 1898, $16.25 Pittsburg, is the present basis. The situation in foundry iron is firm, so far as Southern producers are concerned—the limit of production in Alabama having been reached for the present, with stocks still decreasing—but Northern furnaces are holding prices less rigidly. Conditions are such, however, that no very considerable buying movement would be needed to cause higher quotations. The general expression concerning railroad requirements, in 1898 is that they will be quite as large for rails and considerably larger for rolling stock. Car business is being given out week by week. Bars and structural material are the two lines in which the mills are showing more desire for business. On the former prices are weaker and on structural steel there are reports of more aggressive efforts by certain mills in the territory nearest their competitors. The general feeling is that legitimate business will not share in the retrograde movement recently seen in securities.

THE CLEVELAND DISTRICT.

The statement of iron ore shipments from upper lake ports to Nov. 1, as officially made up, shows a total of 11,270,283 tons, as against 9,093,207 tons to the same date last year, an increase of 2,177,076 tons. This enormous movement, taken in connection with the dock delays, car scarcity and low freight rates of the present season, tells a significant story of the added capacity of vessels with the depth of water they have had this year. Last year's November movement was about 575,000 tons. It is probable that this month's total will be quite as much and that the year's total, with all-rail shipments to charcoal furnaces, will get up close to 12,000,000 tons. If consumption keeps up at today's rate, it will all be needed.

Pig Iron There has been an active week in Bessemer pig iron. The buying by a Northern Ohio interest, begun last week, has kept up, the total taken being between 30,000 and 40,000 tons. A valley mill has bought 25,000 tons, and Pittsburg and Cleveland buying has added a considerable amount. Most of the iron bought for this year's delivery has been on the basis of $9.65 and $9.70 at valley furnace, and $10.25, Cleveland, speculative iron making up about half the total. For 1898 delivery $9.90, valley furnace, has been offered in the week, and on one lot of iron on which deliveries run through January $9.85 is said to have been paid. Furnaces generally are slow to commit themselves, in view of recent sales of coke for 1897 at $1.75 and the probability that this will be the minimum for first quarter of 1898. Foundry irons are slow and weaker. Some inquiry for 1898 supplies is noted. Gray forge is steady at $9 to $9.25 the valley. Some purchases of spiegel and ferromanganese have been made in the week by Northern Ohio steel works. We quote f. o. b. Cleveland:

Bessemer	10 25	Valley Scotch No. 1	$11 15@11 40
No. 1 Strong Foundry	11 15@11 25	Valley Scotch No. 2	10 65@10 90
No. 2 Strong Foundry	10 65@10 75	Gray Forge	9 65@ 9 75
No. 3 Foundry	10 00@10 25	Lake Superior Charcoal	13 25@13 50

Finished Material. Bridge works have been buying in the past week. The Toledo works covered for a Chicago Drainage Canal contract, and other concerns took smaller lots making a total of about 2,400 tons. Prices are unchanged. Reports of cutting by Eastern mills have been current, but it is affirmed that 1.10c, Pittsburg, has been maintained on ordinary business in beams and channels. We quote on angles 1c to 1.05c, Pittsburg, with 8½c freight. Bars are weaker. Valley iron mills show more eagerness to sell and on steel there is more competition, extras being less strictly held. We quote bar iron at 1.05c Cleveland and bar steel at 1.05c to 1.10c. Sheet mills are busy. The local producer has been making lower prices of late, for forward delivery. An inquiry for sheet bars, Cleveland delivery, is in the market. In old material buying is light and mills in general are not disposed to consider offers at present.

CHICAGO.

OFFICE OF *The Iron Trade Review*
1142 MONADNOCK BLOCK, NOV. 10.

Railroads continue to be the largest buyers in this territory, and in the last week have made several good contracts for cars, and propose placing further orders soon. They have also come into the market for rails for delivery next year. One of the largest rail sellers in this market stated the first of the week that he looks for fully as large a tonnage of rails for next year's delivery as was placed this year. The railroads are all talking of heavy improvements of all kinds. Bridge building took the larger part of the structural work last week, two of the bridges on the drainage canal having been placed, together with some work by railroads. Aside from this, orders for structural material were not heavy. Other classes of material are selling only in small lots, as a rule, and not a great deal of business is expected to be had in the next month.

PIG IRON.—Sales by the Southern furnaces last week were limited to small lots, and there does not seem to be any increase in the demand in sight for the immediate future. Requirements of consumers for the balance of the year are very well provided for, and it is not likely that sales will be much larger before January. Local furnaces report a somewhat better demand, having had larger sales last week than for several weeks previous. The demand does not have the signs of a permanent movement, however, and it would be no surprise to see it fall off again to some extent. The market is very firm, and the business being placed is all done at full quotations. No changes in prices are expected in the immediate future.

Lake Sup. Charcoal	$12 50@13 00	South'n Coke No. 3	$10 35@10 60
Local Coke Fdy. No. 1	11 50@12 00	Southern No. 1 Soft	11 00@11 25
Local Coke Fdy. No. 2	11 00@11 50	Southern No. 2 Soft	10 60@10 85
Local Coke Fdy. No. 3	10 50@11 00	South'n Silveries	11 25@11 50
Local Scotch Fdy. No. 1	11 50@12 00	Jackson Co. Silveries	12 50@14 50
Local Scotch Fdy. No. 2	11 00@11 50	Ohio Strong Softeners	12 00@12 25
Local Scotch Fdy. No. 3	10 50@11 00	Alabama Car Wheel	16 00@17 00
South'n Coke No. 1	11 00@11 25	Malleable Bessemer	10 75@11 00
South'n Coke No. 2	10 60@10 85	Coke Bessemer	11 50@12 00

CAR ORDERS.—Business placed by the railroads, in cars, was hardly as large last week as it was the week previous, but it was very good nevertheless. The largest order placed was for 1,000 cars, divided by the Norfolk & Western Road between three Eastern and Southern car works. Other orders were for 500 and 250 cars, and some smaller lots. Several new inquiries were received, among them one for 750 cars. The material for the cars is being placed about as fast as the business comes in to the car companies, and constitutes a considerable portion of the total for each week.

RAILS AND TRACK SUPPLIES.—Some business has been taken for delivery next year, of standard section rails, but the mills are not anxious to contract for much of their next year's product at present prices, and this fact is limiting sales. The roads are expected to purchase fully as much steel for 1898 as for 1897, and several of them have already indicated their wants to be fully as large, if not a little larger than they were last year. Light section rails are in good demand, and sales have been very satisfactory. Prices are as follows: Rails, $20.50 to $22.50, according to specifications; steel splice bars, 1.20c to 1.30c; track bolts, with square nuts, 1.80c to 1.90c; hexagon nuts, 1.90c to 2c; spikes, 1.60c to 1.65c.

BILLETS AND RODS.—No sales are reported. Prices are unchanged, and are nominally $18 to $18.50 for billets, and $25 to $25.50 for rods.

STRUCTURAL MATERIAL.—Contracts for two bridges were given out by the Drainage Canal Commissioners, one for 1,200 tons to the Toledo Bridge Co., and one for 530 tons to the Wisconsin Bridge & Iron Co. Other contracts will be placed, from the same source, in the near future. General business was quiet, and included some orders for bridges from railroads. A contract for the business building in Boston, amounting to about 800 tons, was taken last week by a Chicago contracting firm. The market on most products is firm. There is some disposition to shade prices on plates, but no changes have been made in quotations. Quotations are made as follows: Beams, 15-inch and under, 1.30c to 1.35c; 18, 20 and 24-inch, 1.40c to 1.45c; angles, 1.20c to 1.25c; plates, 1.30c to 1.35c; tees, 1.30c to 1.40c. Small lots from stock are quoted at one-quarter to one-half cent higher.

PLATES.—An order for 400 tons of tank steel was placed by one of the large boiler makers last week. General business was light, and was almost entirely in small orders. The market is hardly as strong as it was a week ago, although no reductions have been made in prices. Quotations are as follows: Tank steel, 1.30c to 1.35c; flange steel, 1.40c to 1.45c; fire-box steel, 1.85c to 5c.

SHEETS.—The demand was limited to small orders almost exclusively. One or two contracts of fair size were placed. Dealers do not look for an improvement in the immediate future. Quotations are made at 2.20c to 2.25c for No. 27 black and 80 and 5 to 80 and ½ per cent discount for galvanized.

MERCHANT STEEL.—Business placed last week was not very large, and was almost entirely in small orders. Prices follow: Open-hearth spring tire and machinery steel, 1.65c to 1.75c; smooth finished machinery steel, 1.60c to 1.65c; smooth finished tire, 1.45c to 1.50c; tool steel, 5.50c to 7.50c; specials, 11c and upwards.

SCRAP.—A sale of 1,000 tons of short lengths steel rails, for remelting, was made, and one of 500 tons of iron rails. Aside from these very little business was closed, and the demand is not very large. The market is about as it was a week ago. Dealer's selling prices are as follows:

Old iron rails, gross	$12 75@$13 25	Axles, net	$ 4 00@$14 25
Old steel rails, long, gr	10 50@ 11 00	Cast borings, net	4 00@ 4 25
Old steel rails, short	9 00@ 9 50	Wrought turnings, net	5 50@ 6 00
Old wheels, gross	11 00@ 11 25	Axle turnings, net	7 25@ 7 50
Railroad forge, net	11 75@ 12 25	Mixed steel, gross	..... 7 00
Dealer's forge, net	10 00@ 10 50	Stove plates, net	6 00@ 6 25
No. 1 mill, net	8 00@ 8 50	Heavy melting steel, gr.	8 00@ 8 25
Heavy cast, net	7 7 @ 8 25	Old iron splice b., net	13 50@ 14 00
Malleable cast, net	9 00@ 9 25		

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
807 TRADESMEN'S BUILDING, NOV. 10.

The scattered purchases of Bessemer iron by one consumer have kept furnacemen guessing and at the same time have removed much of the iron that might, before long, have forced a decline in prices. Although the amount already bought is probably large and deliveries run through the first quarter of next year, more, apparently, is wanted. Bessemer iron has not advanced by reason of the sales made. In the finished end of the market sales are smaller again and mills are somewhat more aggressive.

PIG IRON.—The buying of Bessemer during the week has been for the most part confined to purchases by the Lorain interest, although a valley mill is reported to have been a buyer also. The purchases of the former have included most of the stocks on which there was pressure to sell—a quantity of the recently offered speculative iron being taken from second hands. Another lot is reported to have come from Southeastern Ohio. For this years' delivery prices are said to be about $9.65 and for next year on two lots of 10,000 tons each $10.10 is named. The more recent transactions include a lot of 8,000 tons closed Saturday for delivery this year. Other options are understood to be pending. The sales made have produced no higher quotations, but Bessemer is firm at $9.65, valley, for this year. Quotations for next year are still withheld by most interests. Gray forge has not moved noticeably and is held at $9.65, Pittsburg. Foundry irons are weak at the prices quoted. Quotations are made as follows:

Bessemer, valley	$ 9.65 to $ 9.75
Bessemer delivered Pittsburg District	10.35 to 10.50
No. 1 Foundry	10.85 to 11.00
No. 2 Foundry	10.35 to 10.50
No. 3 Foundry	10.00 to 10.25
Gray Forge, Pittsburg	9 65 to 9.75

BILLETS.—Billet deliveries have improved in the last few days and the market falls slightly as stocks become more available. Mill quotations for this year are $16 and $16.25 valley and Pittsburg, respectively, and for 1898 no higher prices are asked. There are still a number of mills unable to ship with any degree of promptness but the general situation is easier.

SHEET BARS.—Sheet bars are bringing $18 and $18.25 for this year and higher prices for rushed shipments. Shipments are still very slow.

RODS.—A lot of 3,000 tons of rods for immediate use is reported sold at $23.90. Prompt shipments are quoted at $23.50 and $24, and $22.50 and $23 for next year.

STRUCTURAL MATERIAL.—Demand for shapes is smaller as winter approaches but there is no indication of a decline in prices. Beams are being held at 1.10c for 15 inches and under and 1.20c for larger sizes. Tees are quoted at 1.20c; zees, 1.10c; angles, 1.10c and plates, 1.05c to 1.10c.

BARS.—Mills having large capacities for steel bars have begun to feel the decline in demand for finished material. There is a general eagerness for orders and 1.05c and 1c are quoted, while there is some disposition also to ease on extras. Bar iron is fairly active in the valleys and in steady demand in Pittsburg, the two deliveries being quoted respectively 1c and 1.15c. Branded all-muck bars are quoted at 1.20c to 1.30c.

PLATES.—The decreased demand has not perceptibly lowered mill quotations which are held as follows: Tank, 1.10c; shell, 1.15c to 1.20c; flange, 1.20c to 1.25c.

SHEETS.—Sheet bar deliveries have improved but there is no change in black sheets of smaller sizes. No. 28 is selling at a premium, 2.25c being given for immediate deliveries and 2.15c and 2.20c for later shipments. On Nos. 27 and 28 mills are still behind. Galvanized sheets at 80 and 2½ per cent off have been selling heavily, as mills are catching up with orders. Black sheets for tinning are quoted at 2.30c and 2.35c, maker's mill.

IRON AND STEEL SKELP.—Skelp has been bought in good quantities in the last few days, the orders being divided between Eastern and local sellers. Most of the amount taken is for immediate shipment. These purchases help the local situation. Mills quote: Grooved iron skelp, 1.15c to 1.17½c; sheared iron skelp, 1.27½c to 1.30c; grooved steel skelp, 1.02½c to 1.05c; sheared steel skelp, 1.10c to 1.12½c.

PIPES AND TUBES.—Two good pipe line orders were up during the week and one of them—15 miles of 4-inch—was placed with Pittsburg. The other calls for 15 miles of 6-inch and seven miles of 8-inch and local mills presented bids. Both lots are for Indiana delivery. With the skelp supply easier and deliveries less congested, pipe mills are in better shape to take orders and merchant pipe is some weaker. In general discounts are held firmly as follows: Butt weld black, 72 per cent off; lap weld black, 78 per cent off; butt weld galvanized, 67 per cent off; lap weld galvanized, 70 per cent off. The second discount is 10 per cent on car load lots. Discounts on merchant boiler tubes are as follows: 2¼-inch and smaller, 72½ per cent off; 2½-inch and larger, 75 per cent off.

FERRO-MANGANESE.—Quotations are made for 80 per cent domestic, of $47.50 and $48, depending on size of order.

OLD MATERIAL.—There is little life in old material and no sales over 300 tons in size are reported. Prices quoted follow: Old iron rails are quoted at $14 and $14.50; old steel rails, $10.50 to $11; No. 1 wrought, $12.50, net; cast scrap, $9 to $9.25, gross, and car wheels at $11.

IN OTHER MARKETS.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Cincinnati. Sellers of pig iron have not made active efforts in the past week. Business has been quiet and the energies of commission men and brokers have been devoted to getting forward iron on old orders. The car famine seems to be as bad as ever, and consumers fortunate enough to have a supply of pig iron are in many instances embarrassed by lack of coke. A prominent iron producer in the Birmingham district states that conditions there have never been worse so far as production is concerned. The furnaces now operating have consumed the surplus stocks of ore that were accumulated to run them through bad weather, and a number of them do not know from one day to the next whether they will be obliged to bank or not. It is thought that the tendency is toward a lower rate of production, and that this condition will continue until after the first of next year. Stocks of iron in the South are decreasing rapidly, the principal producer having shipped 30,000 tons in excess of current output during the month of October. There has been a limited demand for all grades of iron, both coke and charcoal, Northern and Southern, but with few noteworthy transactions. The holders of warrants most anxious to sell have apparently disposed of their holdings, for but little has been heard of offerings of that kind during the past week. We quote for cash, f. o. b. cars Cincinnati: Southern coke, No. 1 foundry, $10; No. 2, $9.75; No. 3, $9.45; gray forge, $9.25; mottled, $9; No. 1 soft, $10; No. 2 soft, $9.75; Belfont coke, No. 1, Lake Superior, $11 to $11.50; Belfont coke, No. 2, Lake Superior, $10.50 to $10.75; Hanging rock charcoal, No. 1, $14.50 to $15.50; Tennessee charcoal, No. 1, $12.50 to $13; Jackson Co. silvery, No. 1, $12.50 to $13; standard Georgia car wheel, $14.25 to $15.

Buffalo. The volume of new business has not been large during the past week. From a selling point of view, it would be called a quiet market, but from a shipping point of view, an active one. Nearly all active funaces find themselves heavily over-sold, and are bending every energy to keep deliveries going where they are needed most. The urgency of consumers in every section to get iron forward on their orders indicates that the metal is going directly into manufacture, and the consumption large. So far as our observation goes, the makers of pig iron have their hands full until Jan. 1. Prices are stationary on the basis given below, cash f. o. b. cars Buffalo: No. 1 foundry, strong, coke iron, Lake Superior ore, $11.25; No. 2, $10.75; Ohio strong softener, No. 1, $11.75; No. 2, $11.25; Jackson county silvery, No. 1, $14; Southern soft, No. 1, $11.75; No. 2, $11.35; Niagara malleable, $10.75.

Philadelphia The Eastern market has been very quiet for the past fortnight and with buyers holding off there is naturally a weaker feeling. It is to be expected that in the balance of the year business will go on at a slower pace, but meantime contracts for next year will come up and the feeling that prevails while these are under negotiation will have much to do in making prices. Some irregularity is predicted for the next six weeks, but in general sellers are governed by the broad considerations of heavy consumption and the prosperity in all lines that is expected in the wake of agricultural prosperity, and there is little disposition apparent to press sales now. Pig iron sales have been light in the past week and for immediate shipment no great amount of business is expected in November and December. Something is being done for 1898 delivery, and for the first three or four months iron can be bought at substantially the quotations of to-day. We quote No. 1X foundry, at $12 to $12.25; No. 2X foundry, $11.25 to $11.50; No. 2 plain, $10.75 to $11; mill iron, $10.25 to $10.50; basic iron, $11 to $11.25; Bessemer, $12.50 to $12.75. Bessemer steel billets are weaker and for 1898 delivery $18.25 to $18.50 is the basis talked of. Little buying is done, however. For prompt delivery little steel is to be had. The market for finished material is confined for the time being to small amounts. The mills are still running full but the volume of going business is not what it was in early October. No anxiety is shown for tonnage, but concessions can be had from the quotations recently ruling, particularly on bars. We quote refined bars at 1.15c to 1.20c; steel bars at 1.20c; plates at 1.20c to 1.25c; angles at 1.20c; beams and channels, 1.25c to 1.35c.

THE TIN PLATE MARKET.

The dull and unsatisfactory condition, noted for the past few weeks, still continues and no quotable change has taken place. Few orders of any kind have been placed and the fact that sellers' views of prices remain firm and the undertone of the market is decidedly stronger, even when no business is doing, argues well for a higher market when trade naturally revives. The can makers are very hopeful about next year and expect very heavy business and therefore large consumption of tin plate. Yet very few if any of the Western can makers have bought their 1898 plates. It can not be expected that there will be much buying till December or early January.

We quote:

CHARCOAL TINS.

	IC	IX
Lisvane Grade,	$3.45	$4.20
Calland Grade,	3.65	4.35

COKE TINS.

IC, 108 lb. Basis weight,	$3.00
100 lb. " "	2.90
95 lb. " "	2.85
90 lb. " "	2.80
85 lb. " "	2.75
80 lb. " "	2.70

TERNE PLATES.

IC, 216 lb., 20 x 28	$5.95
200 lb. "	5.65

PRICES are being asked on 7,000 tons of iron pipe for use in connection with the new water works at Kobe, Japan. British and German as well as American pipe makers will bid.

THE IRON TRADE REVIEW

DEVOTED TO IRON AND STEEL MANUFACTURE, FOUNDRY AND MACHINERY TRADES.

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"STANDARD OIL CO. METHODS" IN IRON.

Some of the comment that has found its way in print relative to the introduction of Standard Oil Co. methods in the iron trade has been dignified beyond its desert. Mr. Rockefeller's ownership of iron mining properties dates back nearly four years; yet there is no sign to-day, despite all the reports that have come out under great headlines, from time to time, that he is one step farther down the line, in iron production, than on the day he came into ownership of Mesabi mines. To sell to a large steel producer an iron mine, instead of selling him or others the ore from that mine, year by year, does not argue that Mr. Rockefeller is preparing to bestride the steel world. To sell the only old-range property which he controls (his interest in other Gogebic mines is understood to be less than a controlling one) certainly does not signify a disposition to embark in steel making. Nor does the building of three new vessels, to be ready for the season of 1898, signify that Standard Oil Co. methods are to prevail in the lake carrying trade, or that the existence of the Rockefeller fleet is a death-knell to independent carriers, as some sensational articles would have us believe. The iron trade is an industry of vaster proportions than would be inferred from the statements recently made anent the acquisition of the Gogebic mines by the Carnegie Steel Co. And the vessel interests of the lakes are something greater than could be controlled by a fleet representing less than 5 per cent of the total valuation of floating property.

When it is remembered that Mr. Rockefeller's entrance upon the Mesabi range was through an investment in the securities of the railroad that was built expressly to carry the ores of the newly developed properties there, the key is given to his operations in connection with the iron industry to-day. The carriage by vessel or rail, or both, of all ores that its mines produce or that are produced by mines which it leases to others, is evidently the chief aim of the Rockefeller interest. Mine ownership and the sale of ore in the market are but incidental to this programme. With this fact in mind it can be seen that to bear the freight market would be a strange proceeding for one of Mr. Rockefeller's business astuteness. Nor would his interest be served by bringing the price of ore to an unprofitable point; for that would mean that rail freights and vessel freights must stand a share of the shrinkage. The case of the Carnegie Co. and of Mr. Rockefeller, both in their individual and their related capacity, is not that of two great interests deliberately creating new conditions, but rather preparing by every means at their disposal to meet new conditions and profit by them to the largest possible extent.

A UNION OF NON-UNION LABOR.

A unique movement and one that throws light on the oppressive burdens trade unionism in Great Britain is putting, not only upon capital, but upon labor, is that of the National Free Labor Association which held its fifth annual congress in London in mid-October. Delegates were in attendance representing non-union workingmen in the great industrial centers of Great Britain and Ireland. The report of the general secretary showed a membership of 182,000, of which 22,000 had been added in the first nine months of the present year. The most important resolution passed by the congress declared that the time had come for the formation of one comprehensive and far-reaching federation of the non-unionists of all trades and occupations, skilled and unskilled, throughout the United Kingdom, for mutual assistance and combined effort in trade disputes; and the executive council of the association was instructed to take steps for the formation of such an organization. Another resolution passed, which indicates the purpose of the movement, is as follows:

> That this congress of delegates representing 182,000 workmen, rejoices in the fact that free labor principles are making steady and certain progress among the industrial classes of the country in all branches and sections of trade and labor; and recognizes this gratifying testimony to the growth and permanence of a consolidated Free Labor Federation, indicating a desire on the part of the great majority of workers to be freed from the thraldom of irresponsible demagogues who, under cover of trade unionism, are gradually and surely sapping and undermining the spirit of honest and honorable combination for the improvement of labor and the development of trade and commerce.

The address of the president of the congress contained the statement that since 1889, the year of the great dock strike, no less than 100 millions sterling had been lost in wages, in dislocation of British trade and the transfer of commerce abroad, by the promulgators of unwise industrial teaching, to whom the workingmen of the country had lent a too-willing ear. The speaker said that more and more were workmen desiring "to be protected against the secret doings of the strike committee and the cowardly intimidation of the trade union picket." The proposal now before the association, he said, was "to organize unorganized labor on lines very different from that species of organization which had proved by experience to have wrought so much industrial disaster." The plan was to form an organization for purposes of industrial peace instead of industrial war; for contributing toward sick

benefit and insurance funds, instead of building up huge strike funds, bringing disaster to employers and employed; for laying the foundation of a peaceful and conciliatory treatment of industrial disputes by mutual conferences, a wise regard for economic conditions, and friendly counsels between the representatives of capital and labor. The president added that he wanted to see trade unionism a peaceful machine and not a fighting machine, and it was the purpose to ask the 10 or 12 millions of non-union employes—men and women—in the United Kingdom to join the federation and help to make it a destroyer of strikes.

Trade unionism in the United States has not gone to the length of tyrannizing capital and labor that is illustrated in the battle now being waged against engineering firms, and that is so severely characterized by this Free Labor Congress. Yet there is crying need here of a movement for peace and conciliation, in place of the bitter antagonisms and the waste of resources from which American industry has suffered in the past 20 years. Quite apropos of the present article is the report on another page, of the recent address of Mr. Wm. H. Pfahler, of Philadelphia, before Western foundrymen gathered at Cincinnati. We trust Mr. Pfahler and his associates may yet see tangible fruits of their disinterested and commendable endeavors in this behalf. It is indeed gratifying to note these advances toward industrial peace in the two nations that lead the world in manufacturing and mechanic arts.

It is strange how some minds stumble over a little matter of mathematics; and how to cover their inability to cope with figures they are wont to say that figures can be made to prove anything anyhow. For example, in the little table printed a short time ago in these columns and elsewhere, showing the large increase in output of mills in the Mahoning Valley in the first half of September, as compared with the first half of the corresponding month in 1897, and a noteworthy increase in number of men employed and wages paid, there was material sufficient to entangle hopelessly several contemporaries that essayed to comment thereon. One stumbling block was that one set of figures showed a tonnage cost of $10.10 in 1896 and of $6.95 in 1897. The sapient commentator at once jumped to the conclusion that prosperity had not come, when the wage cost of a ton of material was less than in the preceding year. Evidently the possibility of reducing tonnage cost by the operation of a plant to full capacity never dawned on this critic. Nor does he seem to know that when a mill is run for two days in a week, there are not as many tons per man produced in a given time as when six days of double turn work is done in a week; otherwise he would scarcely attempt to impeach a set of figures because they showed a larger output per man under the one condition than under the other. It is a fact that a reduction of 5 to 10 per cent was made in wages in Mahoning valley mills; but there is no question as to the choice of the workmen as between the net results of operations at one-third time, with starts and stops all through the month, at the old wage, and running double turn six days in the week. As compared with the doubts and uncertainties of 1896, and the scant pay envelopes of that dark year, the regular operations and the heavy pay rolls of to-day are well nigh paradisaic.

RECEIVED FROM THE TRADE.

Uehling, Steinbart & Co., Ltd., of Newark, N. J., have issued a pamphlet describing their gas composimeter. The principle of the device is based on the laws governing the flow of gas through small apertures. The pamphlet discusses the conditions which must be filled by a practical apparatus designed to reveal the composition of a gas. These briefly stated are: The gas must be brought to the instrument under a constant tension and must be drawn through the apertures to and from the containing chamber with a continu us and perfectly uniform suction; the apertures must be located in a medium of constant temperature and must remain perfectly clean; the chamber must be made perfectly tight so that no gas can enter except through the aperture provided; the gas must be freed from moisture; the constituent to be measured must be completely absorbed while the gas is in the chamber. The apparatus is described and illustrated in detail and its adaptation to the requirements referred to. Where a large boiler plant is employed the gas composimeters are arranged in systems, combining eight to 16 instruments.

"Generators and Motors" is the title of an attractive pamphlet issued by the Keystone Electric Co., of Erie, Pa. It describes and illustrates this company's class "C" direct current multi-polar generators and motors for light and power. The half-tone cuts of the complete generators and motors and their parts are supplemented by drawings showing the assembly and foundation, the connections of the machines and the possible arrangement for belted units.

A quarto-size catalogue of the Q. & C. Co., of 700-709 Western Union Bldg., Chicago, manufacturer of railway specialties and special machinery, gives particulars of the various machines the company manufactures for the cold sawing of metals. Ten different saws are shown, ranging from the No. 1 shop saw, designed to cut tool steel, and to do a large variety of small work, to the No. xxxxx power sawing machine, weighing 18,000 lbs. and intended for steel casting work, foundry work, the cutting off of shrink heads up to 14 inches diameter, sawing irregular shaped castings, etc. The sawing machinery of this company has attained an excellent reputation and is very generally in use.

The important part of the work of the Division of Mineral Resources of the U. S. Geological Survey, relating to coal production is, as heretofore, in the very capable hands of Mr. E. W. Parker, and his monograph, "The Production of Coal in 1896," has just been issued. It contains 286 pages of statistical and descriptive matter of much value to the great coal interests of the country. Mr. Parker has also prepared the report on "The Manufacture of Coke in 1896," consisting of 92 pages. The reports on petroleum and natural gas, of which we have also received copies, are prepared by F. H. Oliphant.

The Connellsville coke trade, according to the *Courier*, is at a stand, though additional resumptions are expected now that the drought has been broken. For the week ending Oct. 30, 14,579 ovens were reported active out of 18,383, with estimated production of 146,142 tons against 147,843 tons in the preceding week. The shipments were 8,279 cars, of which 3,085 cars went to Pittsburg and river tipples, 3,752 to points west of Pittsburg and 1,442 cars to points east of Connellsville.

The reorganized Atlantic Iron & Steel Co., of New Castle, Pa., has elected the following officers: Directors, A. M. Byers and W. P. Snyder, of Pittsburg; F. B. Richards, of Cleveland; Alexander McDowell, A. W. Thompson, and Edwin N. Ohl, of New Castle. The directors elected the following officers: President, A. M. Byers; secretary and treasurer, A. W. Thompson, and Edwin N. Ohl, general manager.

President A. J. Moxham, of the Johnson Co., Lorain, O., has returned from a stay of several months in England.

THE CHEMISTRY FAD (!) IN THE FOUNDRY.

BY DR. R. MOLDENKE.

Under the above caption, Mr. E. H. Putnam in the *Tradesman* of Oct. 15th, enlarges upon one of the important issues of the foundry business of the present day. Were it not for the harm it might do the practical foundryman who has been compelled to put on his thinking cap on account of the fearful cut in prices, the criticism in question had better pass unnoticed. Mr. Putnam at least admits that chemistry has a place in the foundry business, which pleases the writer, but he states further on that it is not so universally important as is claimed for it. Probably—but let us tell a little story in this connection. Some years ago, when chemistry had not yet come to be a fad in the foundry, and pig iron was sold by grading only, a friend of the writer, the secretary in a large railroad office, had occasion to visit a blast furnace to arrange about rates. Having some time on his hands he sauntered into the yard and watched the men piling metal, each laborer as he picked up a pig showing the fracture to the grader who called out the number, whereupon the pig was taken to its respective pile. The grader, desiring to get off for a short while, requested the secretary to grade the iron for him, which he did, calling off the numbers, which he did not know from Adam, as gravely as possible. How the poor founder felt who got the metal—as Kipling has it, that is another story.

But, says Mr. Putnam, chemistry (which shows up this kind of business very quickly, and is rapidly stopping it) is not of so great importance after all. He holds furthermore that the chemist belongs at the blast furnace, and not in the foundry, that he is useless in the smaller foundries anyhow, and belongs only where expensive mixtures are used in the production of specialties

Aside from the fact that smaller foundries need only employ a chemist for a small portion of the day, and that there are numerous laboratories which make a business of supplying just such a demand, these larger plants which employ a metallurgist, and which formerly made their specialties with expensive irons, now use cheaper irons and get just as good results. This very fact has brought down the prices of charcoal iron and other high grades very considerably.

The fact that some people who know little about metallurgy have stumbled upon improvements in mixing iron without the aid of chemistry signifies nothing; for a compulsory change in their brands would leave them where they were formerly, in spite of test bars and the like. The true scientist does not, as Mr. Putnam claims, sneer at the founder who does not swallow whole everything said in favor of chemistry in the foundry. He knows that to-morrow might bring forth a discovery far in advance of even chemical methods. He therefore seeks to aid the founder to the best of his ability, and also knows that the intelligent use of test bars is an excellent thing. Chemical tests, combined with physical tests, give the best results in the light of our present knowledge.

On a strict examination to learn how the cheaper grades of iron found their way into foundries not employing chemists, it will be found that the pig iron dealer brought about this improvement. For, when the foundries employing metallurgical talent began buying from blast furnaces heretofore considered out of their line of requirements, the furnace managers at once sought to extend their market and thus disseminated whatever information they could obtain to aid them in so doing. The result is that many a foundry which would have had to close up permanently has kept above board, while those that would not learn went under.

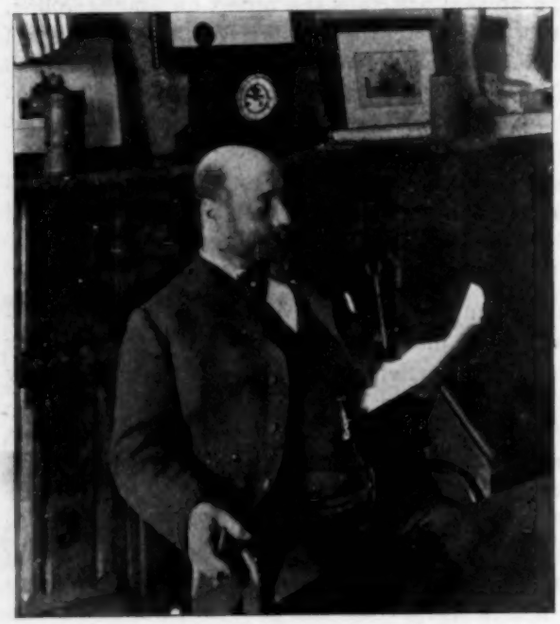
To finish up with another story, the writer remembers discussing the subject of the application of a scientific education to foundry practice, several years ago, with a well but not favorably known foundry superintendent. This man scouted the idea of giving his children any higher education whatever. He did not believe in education anyhow, as he had none himself, etc. Considering that even a common laborer will educate his children, as well as his scanty means will allow, this was astonishing. But mark the sequel: This man, becoming an impossible quantity where he was, went to a large city further west, opened up a foundry, and soon demoralized prices to such an extent that the gray iron business of that city was ruined, and to-day foundrymen go about ready to knife each other, so to speak, at the least provocation. Yet this man made money in his little foundry, and sold out at a handsome profit.

The moral of the story is this: In what condition were the other foundries of that city which had to sell at cost to hold their customers? Would not more scientific economy have enabled them to compete, and possibly crush this interloper? To conclude: Sandless pig metal, cast in chills, is the coming thing in the iron industry, judging iron by its fracture necessarily becoming a thing of the past. Will the foundryman be content to rely on an outsider's word for what is in that iron? Hardly. With half a dozen different brands all looking alike when broken, and no laboratory to tell him, where will Mr. Putnam be at?

OBITUARY.

P. J. BENBOW.

Prestwood J. Benbow, manager and president in America of the Otis Steel Co., Ltd., died at his home in Glenville, a suburb of Cleveland, on Friday, Nov. 5, from injuries received two days previous, on the Lake Shore Railroad. In walking from his home to the station on Wednesday morning, Mr. Benbow crossed th e Lake Shore tracks. In stepping aside out of the way of an approaching train, he did not take note of a freight train on the other track, and in an instant was struck



by it and hurled some distance. He was removed to his home, but in the two days that elapsed before his death did not recover consciousness.

His death under such distressing circumstances was a severe blow to the associates of Mr. Benbow. In five years' residence in Cleveland he had become known for close application to the affairs of his company; its interests were always his first thought. Coming to the United States with a long experience in the iron and steel trade on the other side, he devoted himself to the new work with unflagging energy. In his short career in the steel trade in this country he had won many friends who sincerely regret his untimely death.

Mr. Benbow was born in Birmingham, Eng., in 1840, and was educated at Dudley Grammar School, Warwickshire. Later he studied mining engineering and in the late '50's he made a long visit to the United States. In 1862 he returned to England and connected himself with the firm of Lockhart, Tozer & Co., iron and steel factors, and for 17 years managed the Manchester branch of this company. In 1882 he removed to Cardiff, Wales, representing the same firm there for several years. Coming to this country in 1892 as an associate of Mr. Holland, then managing director of the Otis Steel Co., Mr. Benbow was appointed general manager in 1893. Then came the receivership, in which Mr. Benbow was associated with Mr. Carl, of Cincinnati. On the reorganization, Mr. Benbow was made "president in America," and was active manager of the business.

The funeral was held at the residence on Eddy Road, Glenville, Monday afternoon, Nov. 8, and was largely attended. Mr. Benbow is survived by his wife.

P. S. LOUCKS.

Peter S. Loucks, chairman of the Scottdale Iron & Steel Co., Ltd., and a pioneer of Scottdale, died October 6, at the age of 57. He had been ill for about a year.

H. A. BEALE.

Horace A. Beale, president of the Parkesburg Iron Co., Parkesburg, Chester county, Pa., died at that place Wednesday, Nov. 3, of paralysis, aged 70 years. Capt. Beale took an active part in the defense of Pennsylvania against Confederate invasion in 1862 and 1863. He established the Parkesburg Iron Works in 1873, engaging in the manufacture of boiler tube skelp and iron and steel boiler plate.

H. T. RUSSELL.

Henry T. Russell, for the last 15 years superintendent of the Union Drop Forge Co., of Chicago, suddenly while at lunch in the Revere House in that city, Nov. 5. Death resulted from heart failure. Mr. Russell was 65 years old, and had a wide acquaintance among the iron and steel men of Chicago, and had been connected with the iron business practically all his life. He went to Chicago from Hartford, Conn., 15 years ago. He was born in North Brookfield, Mass.

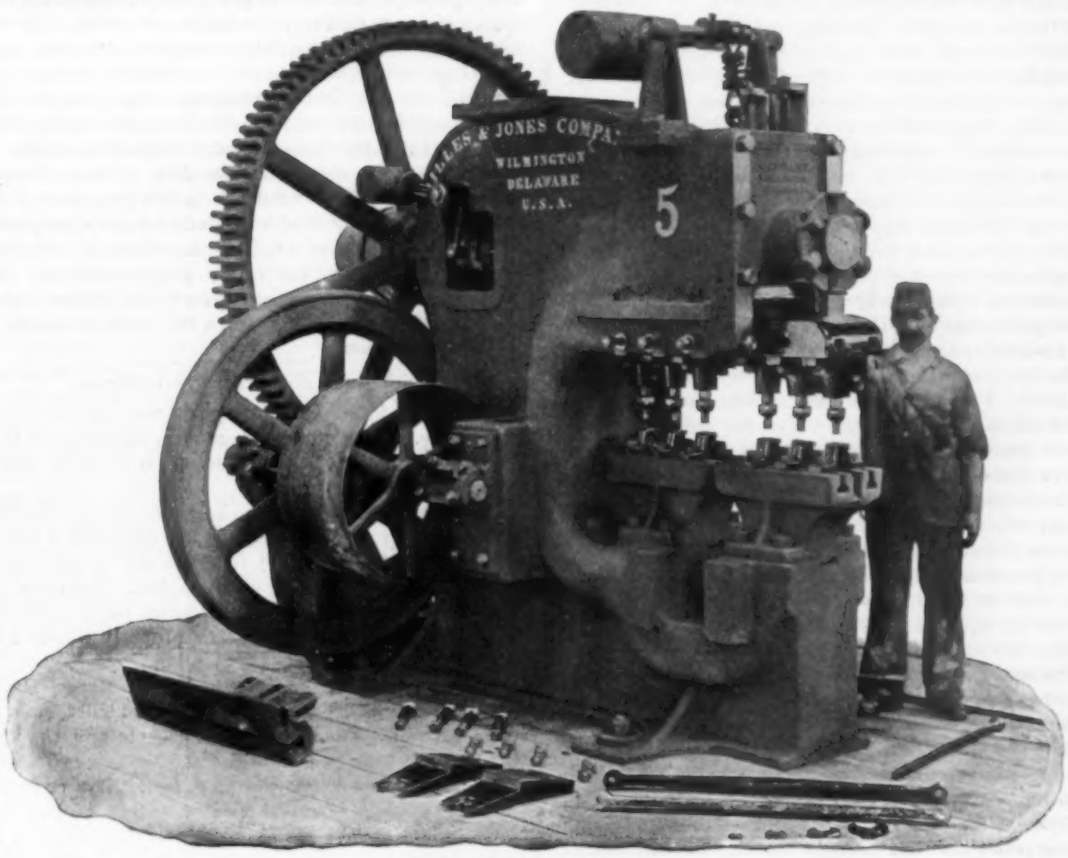
THE recent sale of the Wellman Steel Co.'s plant at Thurlow, Pa., wipes out all the $500,000 stock, all the $283,000 three per cent third mortgage bonds and $140,000 of the second mortgage bonds. There were in all $600,000 in bonds.

THE Lidgerwood Mfg. Co., has perfected a new hoisting engine which is known as the Lidgerwood safety derrick engine, patented. A double drum engine, with two 6¼x8-in. cylinders, is now on the floor of the Lidgerwood Mfg. Co.'s warerooms at 96 Liberty st., New York.

AN American manufacturer of cast iron pipe, according to the London *Contract Journal*, has offered to furnish the gas department of Glasgow with 900 tons of large sizes of pipe at about $5 per ton cheaper than the home bidders. The standing of the American bidder was to be investigated before awarding the contract.

PUNCH FOR STRUCTURAL WORK.

The illustration shows a punching machine for beam and channel work, manufactured by the Hilles & Jones Co., of Wilmington, Del. This machine is a special construction of the regular structural iron punch of this company. The range of punches, which are secured to the sliding head, is increased over the usual type, so that the extreme center to center distance of the outside punches can be made 38 inches. The sliding head is made entirely of cast steel to give it sufficient rigidity and strength; punch and die holders are also of this material. The illustration shows six punches and dies in position, but this number can be increased or diminished at pleasure, each punch having a separate gag so that it can be used independently of each of the others if desired. Another special feature in the construction of this machine is that the floor space is economized by bringing the pulleys alongside of the main frame, as will be noticed. There is an improved adjustable automatic stop working a three-jawed clutch as on the standard designs of single punches and shears. This tool will cover a very great range of work, both plate and structural, and is especially useful in bridge and structural shops. Capacity is equal to punching two 1 1-16 inch diameter holes through 1-inch iron at one stroke.



PUNCH FOR STRUCTURAL WORK.

IN another column is announced the sale at public auction of the Sweet Mfg. Co. plant at Syracuse, N. Y., which will occur on Nov. 17. The property includes 220,000 square feet of land in the city of Syracuse on which are standing substantial brick buildings. Repairs have been recently added to the buildings, putting the entire property in good condition.

THE American Steel Barge Co., West Superior, Wis., will at once erect a large machine shop, 84x150 feet, to be in operation before May 1. When the new shop is completed the company will be in shape to build all its own marine engines.

THE plant of the East Chicago Iron & Steel Co., at East Chicago, Ind., will be sold by the receiver of the company, A. M. Turner, on Nov. 17, at 2 P. M., on the premises of the company. No bid will be received for the property less than $40,000. Payments will be made one-third cash, one-third in 90 days, and one-third in one year from date of sale.

THE FOUNDRYMEN'S DEFENSE MOVEMENT.

In our report of the Cincinnati meeting of the Western Foundrymen's Association in *The Iron Trade Review* of Oct. 28, we gave a brief synopsis—all that space then permitted—of the excellent address of Wm. H. Pfahler, of the Abram Cox Stove Co., of Philadelphia, advocating the formation of a defense association among foundrymen. Mr. Pfahler said that he expected soon to present the matter to a like meeting of Eastern foundrymen who had promised their support to the project; and in view of the general interest now being taken in the subject we are glad to give a more extended report of Mr. Pfahler's Cincinnati address, from notes taken at the time.

"No matter has given me more pain," said the speaker, "in observing the tendencies of our modern industrial life, than the general, growing war between labor and capital. I believe it to be a war without a cause. The man who shovels sand in your foundry has been persuaded by agitators that he does all the work and you none at all; that the average employer gets his livelihood at the expense of those in his employ. Yet the more intelligent the employe is the more he recognizes that an energetic, pushing, industrious employer, furnishes him more and more regular employment than the lazy, unthinking one. Still the work of the agitatior goes on, and the result is strikes, ill-feeling and in many instances a persistent antagonism between workmen and those who employ them. I can say confidently that there has never been a strike in our business that has resulted in any permanent advantage to the strikers. If they have gained a little at one time or in one direction, they have eventually lost it elsewhere. For 15 or 20 years I fought the Iron Molders' Union bitterly; in the past seven or eight years, I have realized the benefits of dealing with them as man with man. I believe, in spite of the politicians and the labor agitators, who stir up strife for a purpose, 60 per cent of the men who work for you desire to further your interest, and believe that your prosperity is theirs. I am convinced that demagogues and politicians who would array labor against capital are largely responsible for present distrust and bitterness.

"I believe that counter-organization is the only means of allaying the feeling that has been stirred up. It is organization that has overthrown political bosses; organization will take away the power of unwise and designing labor agitators. Foundry employes are appealing to us to-day to organize, because they want us to interpose our strong arm to defend them against the agitator who has done so much to stir up this trouble. We are more than ever interested in a uniform wage in this country, in view of the destructive competition that has grown more severe and more disastrous under these years of depression. If wages are uniform in the same lines of work, they are fair. That means a wage in proportion to the work. Strengthen the good men in your shop and you strengthen the principle of a wage in proportion to the actual labor." The speaker referred, in illustration, to the wise and conservative policy that had brought up the Brotherhood of Locomotive Engineers to the splendid position it occupies to-day, citing instances in its earlier days when its policy was more antagonistic and the standing of its members for efficiency and reliability much below what it is to-day.

"It is to be considered in handling this subject that we are dealing with men who have lost the hope that was in your breasts 30 years ago. When you started out it was under conditions that made it possible for an industrious, ambitious, intelligent man to push up out of the ranks; and there was always before you the stimulus of the possibility that some day you would have a shop of your own and be a director of affairs. Concentration has become so generally the order of things that there is far less chance—very little in most lines—for a man to work his way from employe to employer. With that incentive taken away, there is the more reason for such a policy as shall recognize the mutual interest of employer and employe, and keep the employe's wage on a fair basis. The idea with most shops is that in order to get work off yonder in a competitor's territory, wages must be reduced, so as to get cost down and permit a cut in prices. I say the better way to get at it is to advance wages in the territory in question, and that is what the molders' union and the founders' defense association aim to do.

"As illustrating the spirit of fairness that is fostered by organization among employes treating amicably with organized employers, let me refer to a conversation I have had within the past few days with a labor union leader in the East. He told me that he had frankly said to his men that $2.50 a day is 25 per cent more pay than it was 10 years ago. I was surprised at that admission, yet it was freely made."

"Now that our company is a member of the Stove Founders' Defense Association I never give one thought to the question of labor. A strike or any serious trouble with labor never enters my head. We have not had a strike in the association in three years. If in any shop the men should determine on the spur of the moment to go out, because of some sudden disagreement, they are at once told by their officers to go back to work. The rules of their oganization make it impossible for their leaders to do anything about the matter until the men are at work again."

In conclusion Mr. Pfahler said that he had no disposition to press his views upon any one. He was convinced that the solution of the strike problem was to be reached on the lines followed by the stove manufacturers; and his object in presenting the question was to get an expression from Western foundrymen, so that further steps could be taken by the committee appointed at the Detroit convention of the American Foundrymen's Association. As already noted in these columns, the work of the committee was endorsed by those who heard Mr. Pfahler, and with that endorsement Secretary Penton, of the American Foundrymen's Association, and the members of the committee are now at work shaping the movement for definite results. As is to be gathered from his remarks, and as Mr. Pfahler stated in answer to questions, at Cincinnati, the idea of a defense association is not antagonism to organized labor, but rather greater harmony and conciliation; not to bring wages down to the level of the lowest, but rather to maintain them on a fair basis and thus prevent unfair competitions.

Lake Superior Iron Mines.

T. F. Cole, for a number of years manager of the Buffalo Mining Co.'s properties at Negaunee, has resigned to become superintendent of the Oliver Mining Co.'s Norrie and Tilden mines.

Diamond drill work about a half mile south of the Mansfield mine in the Crystal Falls district has disclosed a body of ore, the drill showing ore at 117 feet and for 77 feet deeper, the width of the deposit being about 40 feet. Analyses show 62 per cent in iron and .051 in phosphorus for ore from the drill hole. A shaft will be sunk. The property will be known as the Minnehaha.

The new dock for the Duluth & Iron Range Railroad at Two Harbors will cost about $185,000 and will have a capacity of 38,000 tons. There will be 208 pockets and the dock will be 1,248 feet long, with a crib end of 50 feet and an approach of 600 feet. The height will be 55 feet. The erection of this dock in the place of an old dock that will be torn down will give a total capacity of 137,000 tons at this port, or a shipping capacity of close to 3,500,000 tons in a season. At Duluth the No. 2 dock of the Duluth, Missabe & Northern road will be extended 576 feet, giving 17,000 tons additional capacity. The Duluth & Winnipeg dock at Superior will continue to be used next season. It is reported that the Great Northern's new line will connect with the D. & W. and that its cars will run over the latter to Duluth and Superior.

The No. 2 shaft at the Canton mine is to be dismantled and abandoned. There is considerable stock pile ore at this mine and operations the coming winter are unlikely.

Wages at the Chandler and Pioneer mines have been advanced 10 per cent.

It is expected that dividends on Minnesota Iron Co. stock will be resumed next year. A director is quoted to the effect that an inventory of the property to-day would show it to be worth double its valuation when the company was originally capitalized. The extraordinary expenses for the fleet, new mines, development work, etc., have been paid out of earnings, and no further heavy expenditures on this account are expected.

The Chandler mine after shipping about 450,000 tons has 200,000 tons in stock and will increase this to upwards of 400,000 tons by the opening of next season. An output of 600,000 tons is expected for 1898.

It is reported that the No. 10 shaft of the Tilden mine, which has been idle for a long time, will be unwatered, the shaft sunk deeper and considerable preparatory work done the coming winter.

CONDENSED FROM THE TECHNICAL PRESS.

The Rusting of Iron Under Oil Paint.—[*Dingler's Polytechnisches Journal*, Sept. 17.]—Edmund Simon opens the discussion of this subject by stating that all the hypotheses advanced heretofore have not completely covered the case. The explanation of the rusting of iron under a protecting coat of paint, now current, is that fine hair cracks are found in the paint which allow the iron to come in contact with the air. These cracks are formed by the unequal expansion of the iron and the paint, as iron is the better conductor of heat. In the case of painted surfaces of some years standing, the supposition is that the compound of the litharge in the oil with its acid, originally flexible and colloidal, gradually changes to a brittle crystalline oxy-compound. The iron cooling quicker than the paint, draws the air charged with moisture into the hair cracks and thus promotes the formation of rust. The author states that his doubts in regard to the above explanation were confirmed by the peculiar action of sea water on painted iron plates, with which he experimented. These plates of painted iron were immersed in sea water for two-thirds of their depth, the other third remaining dry. After remaining thus for six months, an examination showed that for about an inch or so above the water line the paint was cracked, blistered, and even peeled off. The immersed portions of the plates, except for a few rust spots, and as further stated, looked unchanged. The lead paint showed signs of a radical decomposition, while the other paints stood up better, being soft and rough when dried, but not destroyed. The changes remarked in the paints were found to have commenced from within. As the sea water was evidently allowed to penetrate, the adhesiveness of paint to iron was weakened, capillary attraction evidently distributing the water all over the submerged surface, and surface evaporation aiding the destruction above. A further observation was the blistering of the paint due to the formation of salts underneath, making it permeable to water at once. To prove this point better, the author made elaborate experiments as follows: Layers of paint were spread on gelatine coated with glue, dried, and after immersion in cold water, separating the layer of paint from the gelatine. Perfectly sound coats thus obtained were afterwards proven to be permeable to water and salt solutions, when arranged in a dyalizer. Again these coats were shown to be permeable to air, illuminating gas, acid vapors, etc. The result is that layers of paint as usually applied are found to be not only hygroscopic, but also not proof against water and gases. This explains the rusting of iron and steel under protecting coats of paint. In studying the influence of the atmosphere on painted bridges, the author observed that on the lower surfaces of beams, which are not subject to the direct influence of rain, large yellow spots appeared, which turning brown proved them to be rust. Continued observation revealed the origin of these spots to be due to precipitation of dew on the cold iron, a drawing together of the moisture into drops which remain hanging for a long time, and consequently gradually soak through the paint, leaving it porous and open to the action of moisture air, and carbonic acid, which means rust. The conclusions derived were that warmth does not affect paint as much as it is thought to do, and need therefore not be feared in structural work. That paint is hygroscopic, and permeable to water and gases when in a blistered condition. That the more linseed oil a paint contains, and the less the colors are subject to chemical influences, the better the results will be. The nearer the co-efficient of expansion of the iron can be brought to that of the paint, the better. Two coats of paint will not protect iron properly, it takes at least three or four, using a very fat color. Experiments with various proportions of oil and color gave the following mixtures as best adapted for protecting iron work: 100 parts of red lead (by weight) required 12.8 parts of oil. The same quantity of white lead 40 parts of oil, and 100 parts of a color indifferent to chemical action could stand as much as 85 parts of oil. The author 's experience in the preparation of iron surfaces for painting, shows that cleaning the iron well with muriatic acid, then rubbing well with oil, is the only proper way, in spite of what may be said to the contrary; for structural parts, thus prepared, remained piled up in the open for months without a sign of rusting, while other material painted with iron and lead colors direct, peeled off and rusted badly. Further investigations by Prof. Van der Kloes substantiate this mode of procedure, and show that cleansing of the iron alone is not as good as cleaning and oiling it. The authorconcludes with the advice that after all this is attended to, four coats of paint, rich in linseed oil, should be applied, which will give results of the highest character as far as we know it at the present time. M.

Influence of Low Temperatures on Bending Tests.—*Stahl und Eisen*, Sept. 1st.]—Prof. Rudeloff publishes the continuation of his researches on this subject. Three kinds of wrought iron, open-hearth, basic Bessemer, spring, and cast crucible steel, were tested for their tensile strength, as well as with bending and hammer tests. A cooling down to four degrees above zero F. had but little influence on the bending qualities of the materials investigated, spring steel bent to an angle of 84 degrees instead of 91 degrees, and hammered bar iron 139 degrees instead of 150 degrees. All the other samples could be bent double at this temperature just as easy as at a normal one of about 70 degrees F. Cooling down to 112 degrees below zero F. showed a marked effect on all materials except soft rivet iron and merchant bar iron, both of which did not seem to be affected very much. Cast steel suffered most, next came spring steel, open-hearth, basic, Bessemer, and finally wrought iron. In order to study the influence of various methods of testing, the following series of trials were made: Nicked samples were tested in the hydraulic press. Under the drop hammer trials were made of a set of nicked samples, and of a set of sound ones. A detailed description of the method of preparing the samples and conducting the trials is now given, from which the interesting point is the method of obtaining the low temperatures used. Pounded ice and salt gave four degrees above zero F., and solid carbonic acid 112 degrees below zero F. The results obtained were as follows: In bending with the press, it was necessary to judge by the conduct of the bar during the test, and its fracture. Hard and brittle material cracks with a ringing sound, leaving a white fracture. Mild open-hearth steel tears gradually, while wrought iron tears in layers corresponding to the original piling, some of the layers breaking short and allowing others to stretch sufficiently to permit a doubling over without breaking. Brittle material has a granular fracture, tough wrought iron a lamellar, and tough steel a short fibre of dull appearance. The result of these trials was that a reduction in temperature to four degrees above zero does not influence the toughness of wrought iron, while with mild open-hearth steels it begins to produce brittleness. At 112 degrees below zero both materials suffer considerably. Basic Bessemer steel is affected to a greater extent than the open-hearth. The nicked samples gave way long before the sound ones, and were much better adapted to bring out the effect of the cold in these experiments. In the hammer bending tests, peculiar results were obtained with cast crucible steels, which seemed to be least affected by cold. This is somewhat at variance with American observation, especially in railroad service where steel knuckles break more easily in cold weather than in warm. In general it was obseved that sound bars were not affected to such an extent by cold as the nicked ones, and that no special difference was detected between bending the samples under the hammer or in the press, so far as the ultimate results were concerned. M.

The Determination of the Reducing Power of Iron Ores.—[*Chemiker-Zeitung*, Sept. 18.]—Prof. Wiborgh's paper on this subject is reviewed, as presented before the "International Society for Testing Materials for Construction." Iron ores are reduced in the blast furnace by carbon and carbonic oxide. Some ores are reduced easily, others again are very refractory. The first class can be treated with much less fuel because they part with their oxygen at lower temperatures, and are consequently more easily reduced by carbonic oxide. A similar case is found in the various forms of carbon, such as the diamond, graphite, coke, and charcoal; the diamond requiring a very high temperature and burning slowly, while charcoal will ignite readily and is consumed very rapidly. In the case of iron ores, and similarly carbon, the variations noted depend upon the molecular structure, a very crystalline iron ore giving up its oxygen with difficulty, just as the dense structure of the diamond makes it burn only

when forced to do so very strongly. It is well known that the reduction of iron oxygen compounds of the same degree of oxidation is inversely proportional to their specific gravities. Anything, therefore, which loosens up an ore, such as mechanical sub-division, and more especially escape of water, carbonic acid, sulphur, etc., during roasting, renders its reduction easier. It will therefore be seen that the carbonates and hydrated oxides of iron are easily reduceable; roasting magnetite also helps it before further treatment. A dry hematite is more easily reduced than magnetite, for the more saturated an ore is with oxygen, the easier it parts with some of it again. Another property of oxide of iron, which however, has as yet not been sufficiently explained, is that under certain conditions it has the power of breaking up carbonic oxide and throwing out carbon. From the foregoing it will be seen that chemical analysis alone will not give the true commercial value of an iron ore, but there should be in addition a determination of the comparative ease with which its oxygen compounds can be reduced. Prof. Wiborgh has devised the following piece of apparatus to accomplish this. It consists essentially of a gas producer 10 inches in diameter and four feet high, in the center of which a two-inch iron pipe is suspended. Into this central pipe, in which the producer gas circulates, the sample of ore is introduced and left there for a stated time. A description of the details of the producer is now given, as well as the method of carrying out the test. The quantity of ore best adapted for use was found to be 25-30 grammes, or if desired 8-10 grammes, of three kinds of ores in separate charges. The best method of treating the ores was found to be by hanging them in such a position that they were in an atmosphere of producer gas at 720 degrees F. Here they remain for an hour, after which time they are placed in the hottest zone of the producer for another hour at about 1,780 degrees F. Samples of the gases are constantly drawn off to check the process. After the reduction is complete the samples are allowed to cool in an atmosphere of carbonic oxide and afterwards analyzed. This is not an easy matter, as the ores now contain carbon, metallic iron, and iron oxides. The oxygen which remains in this reduced ore forms the basis of what Prof. Wiborgh calls the degree of oxidation, that is the relation between the oxygen found in the oxydized iron and that quantity of oxygen which it would have had if all the iron were oxidized to the ferric oxide, this relation being expressed in percentages. Thus with $Fe_2 O_3$ at 100, $Fe_3 O_4$ is 88.9, and Fe O is 66.7. The determinations to be made are carbon, total iron, metallic iron, and the degree of oxidation. The method used for this purpose are fully described. As a measure of the reduction effected, the degree of reduction, so called, is taken as the actual iron reduced compared with the total iron present. A large number of experiments developed the fact that the most important degree of oxidation of iron ores is 77.8, corresponding to $Fe_9 O_7$. If this point can be reached at a low temperature, the final reduction of the ore is comparatively easy.

M.

THE BATES WIRE NAIL MACHINE.

While wire nail machines have been built that have met with good success, there has been no cessation of effort to improve on each successive type that has been put on the market. The Bates Machine Co., of Joliet, Ill., has brought out a machine that embodies several important features desired by the manufacturers of wire nails and that machine builders have been striving to secure.

In making nail machinery it is necessary to design the structure with sufficient weight of metal to hold the machine in place, and provide a solid frame for supporting the operative parts. The machine bed must be heavy and strong in the lines of gripping, heading and pointing the nails. The operative parts must be made with sufficient range so as not to crowd or bunch them. All adjusting screws and parts must be arranged to be easy of access. The operator must readily see what he has adjusted when he turns a screw, and hence know exactly what he is doing. Means must be provided, also, for readily taking up the wear of operative parts. The nail forming dies and tools must be so adjustably confined that their action on the nails may be controlled. The seating of the nail forming dies and tools must be arranged to remain in adjustment where they are placed, thus limiting wear and permitting the machine to run steadily to insure perfect and rapid nail making. A fully adjustable grip mechanism must be provided which will hold the grip dies absolutely firm while the nail heads are being formed. The wire feeding and straightening device must be fully adjustable and capable of being opened to take the wire in after the wire end has entered the machine.

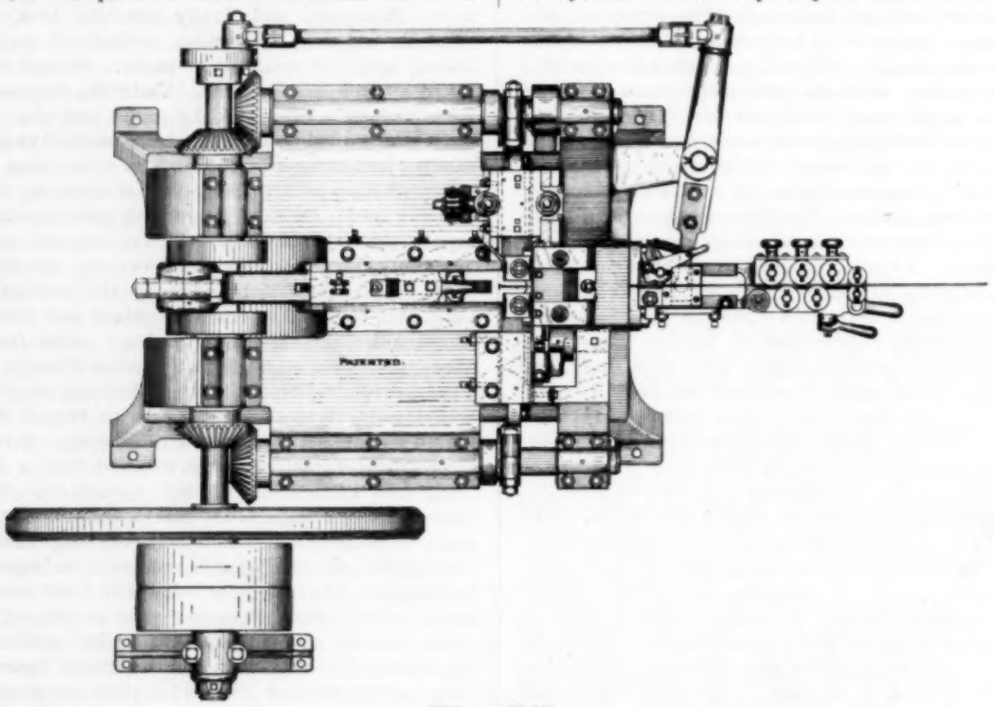


FIG. 1.—PLAN.

The accompanying illustrations show the result of the Bates Machine Co.'s efforts to meet these requirements. The machine is made with a carefully designed bed mounted on a pair of solid standards, quarter boxes cast solid with the bed for supporting the end crank shaft, upon which are placed the drive pulleys, fly wheel, header connection and feed crank disk, and a pair of opposite side shafts, geared to the crank shaft and carrying eccentrics for operating the point cutting mechanism, and a cam for operating the gip mechanism.

The die block is of steel, made removable and with the die seats hardened, and set with a tool steel block back of the grip dies. The header tool is of tool steel, set in a sliding head retained by means of a link and taper key, so that the least wear may be taken up. The heading tool is backed by a steel wedge adjusted by means of a shouldered screw for adjusting the tool to or from the grip dies. The die block is made adjustable toward or from the heading tool by means of a rear steel wedge. The latter is adjusted by means of a

shouldered screw, which regulates the stock from which the nail heads are made and hence gauges the size of the nail heads. The point cutters are carried by means of vertically adjustable clamps on the end portion of opposite sliding heads, which are of steel and connected by means of pitmans to the side shaft eccentrics of the machine. From this source they receive their motion so as to jointly move the point cutters to and from each other, in such manner that they register on the wire line. Their vertical adjustment provides means for bringing them to perfect register vertically, and one of their sliding heads is arranged in an adjustable box, which by means of a shouldered screw is adjusted to bring them to perfect register laterally.

The nail shedder is arranged below the heading tool and controlled by the tool and a spring at its joint, so as to move up in front of the infeeding nail wire as the header tool recedes and be forced down by the tool as it advances, engaging upon the nail and downwardly dislodging and shedding it. The machine is equipped with a feeding and straightening device of approved type. The feeding grip tool is self-hardening square steel, ground square at each end and adapted to grip at each of the end corners, thus permitting it to be reset eight times before being reground. Gibs and liners are provided at all places necessary to take up the wear of parts. Since the structure is heavy and firm, and all parts are well

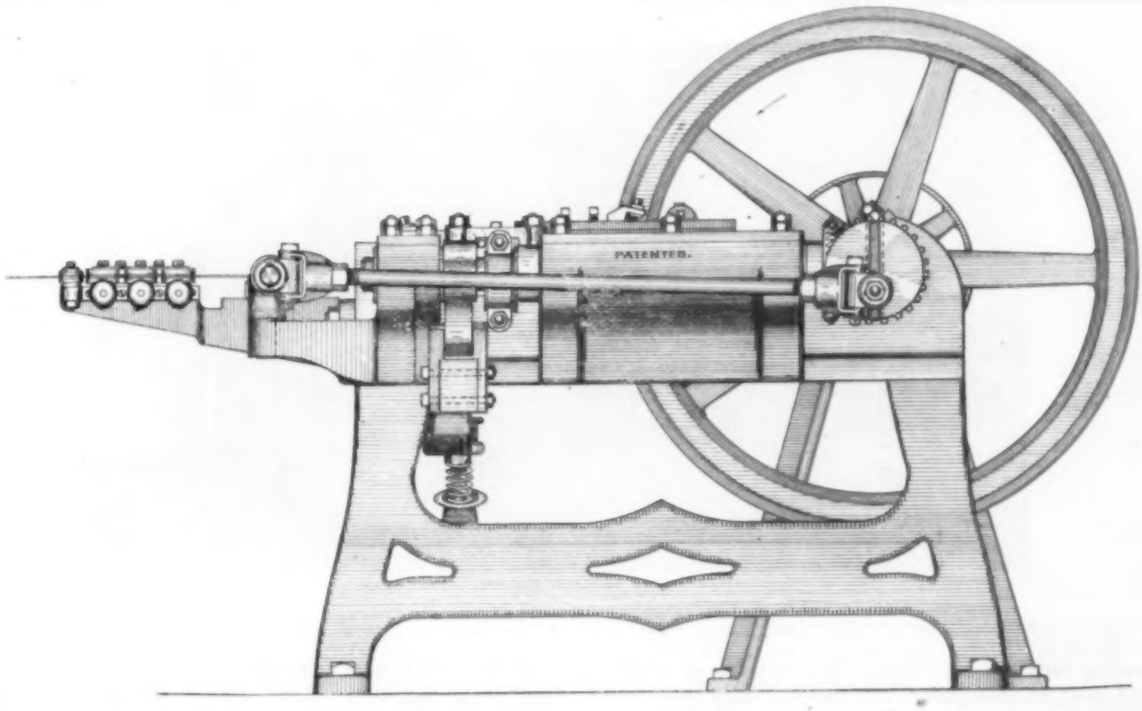


FIG. 2.—SIDE ELEVATION.

designed and fitted, a high speed is attained. Fully 75 per cent of the adjusting of the machine may be done while it is in operation.

By reason of the solid and firm manner in which the machine is constructed and the adjustments held, the nail forming dies and tools are subjected to the least possible wear, and practically remain in operation where they are adjusted, requiring little attention to be given them while running. The nail forming dies and tools require no shims or liners to aid in bringing them into proper position; their holding parts are made adjustable to perform that service well. The feature of cam movements has been eliminated from this machine, except in the instance of the cam for gripping, and that is of steel, hardened. It is a peripheral cam having action at its periphery against a hardened steel roller, favored by a large leverage, and very small in diameter and of but slight throw. All other parts are operated by cranks and eccentrics. All adjustments are in plain view and easy of access by common wrenches, and are so arranged that an operator can see what he is doing when making adjustments. Both operator and helper can plainly see every action of the machine, and by reasonable attention may note the manner of operation and prevent any accident. Provision is made for properly lubricating the machine. All levers are eliminated. The wire line is maintained at the center of the machine, and the machine parts are so designed that the strain due to the formation of the nails is equally distributed throughout the structure.

Winter Work for Lake Shipyards.

Contracts already placed with lake ship builders for winter work provide for 18 vessels—11 steam and seven sail—aggregating in value $3,187,600. All but four of the vessels are to be of steel. There are 14 freight carriers, two revenue cutters for the United States Government, one side-wheel passenger steamer and a large ocean tug. The 14 freight carriers will have a combined capacity of 72,900 gross tons on 17 feet draft. They are evenly divided—seven steamers and seven tow barges. The four wooden vessels are all to be built by James Davidson, of West Bay City, and alike to a big fleet of wooden ships which he has built during two or three years past, will undoubtedly be operated by him, as no purchasers have been found of late for new wooden craft. Two of the Davidson vessels are to be steamers and two schooners, and all practically the same size, 312 to 315 feet over all. Nearly all of the steel vessels will be capable of moving 6,000 gross tons (6,720 net tons) on 17 feet draft, and two of them will carry cargoes of 7,000 gross tons. Two of the steamers will be fitted with quadruple expansion engines, capable of developing 2,500 to 2,700 h. p., and three of them will have Babcock & Wilcox water tube boilers furnishing steam at 250 lbs. pressure. The two vessels that are to have quadruple expansion engines but not water tube boilers will have Scotch boilers constructed to withstand a working pressure of 200 pounds.—[Marine Review.

THE next regular meeting of the Western Foundrymen's Association will be held at the Great Northern Hotel, Chicago, at 7:30 P. M., Nov. 17. A paper by John C. Knoeppel, entitled "Plaster Casts and other Methods of Molding Shell Forms," will be read. In order to make the discussion of this paper as interesting as possible, the secretary asks members and others to submit in writing if possible, any comments or criticisms on the paper, member's proofs of which have been sent out. Members are also requested to submit questions relating to any phase of foundry practice that they may desire to have discussed by the association, and reports of experience or phenomena observed in daily work, for discussion at future meetings.

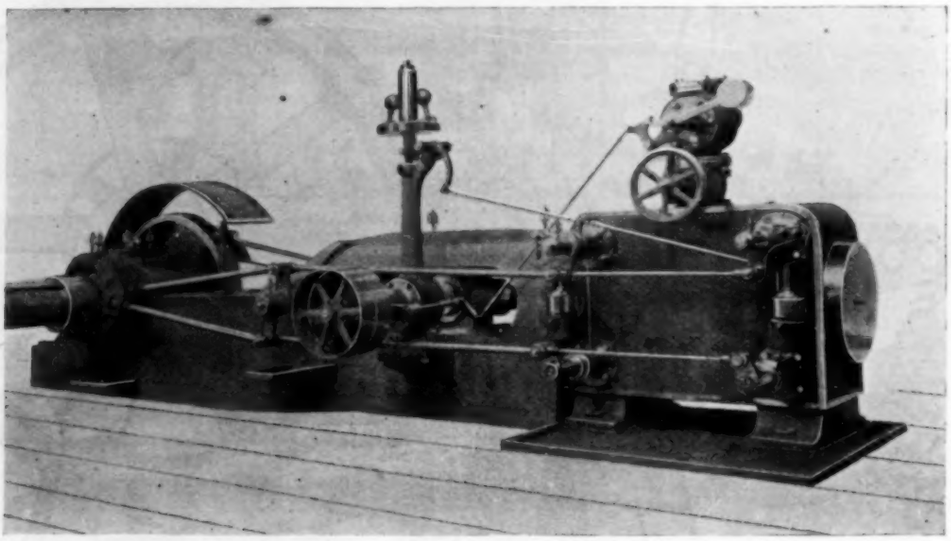
THE old Valley muck bar mill of the Sharon Iron Co., at Sharon, Pa., which has been idle for over two years, was put in operation last week.

A NEW HEAVY-DUTY ENGINE.

The accompanying illustration gives a view of the valve gear side of a heavy-duty engine built by the Lane & Bodley Co., of Cincinnati. The frame as shown has a continuous bearing upon the foundation from beyond the crank to the cylinder head. The whole frame being cast in one piece avoids the usual joint at the end of the slides. The frame entirely surrounds the crank, and in the short strokes the bottom of the bed is closed, forming an oil tight receptacle. The slides are bored to a large radius, giving a wide bearing surface, with the top slides amply strong for the crosshead strains, when running under. The main bearing has an adjustable bottom box by which the center of the shaft may be raised or lowered, permitting that accurate adjustment necessary to the proper centering of the armature and the stationary field magnets.

The valves are made with double port openings, giving a very free steam admission. The dash-pots are mounted on the side of the cylinder, out of the dirt which is unavoidable at the floor line.

This type of engine is almost always built with double eccentric valve motion; one eccentric for the steam and another for the exhaust valves, thus permitting governor control of the valves to a late cut-off, yet securing the best results of compression, which cannot be obtained with a single eccentric



A NEW HEAVY-DUTY ENGINE.

operating both sets of valves. The cylinder is neatly enclosed in a plate steel jacket, with polished angle iron corners; and radiation is avoided by liberal packing of non-heat conducting material.

The cross-head is of box form, with top and bottom slippers full Babbitt metal faced and adjustable, and the pin is removable. The connecting rod is of the solid end type, with boxes adjustable by wedges and screws; the crank pin end having a full Babbitt metal lining.

The speed regulating governor is of the Hartnell patent, a high speed, spring-loaded governor, susceptible of delicate adjustment, and securing perfect regulation.

On this engine the usual automatic device for preventing the opening of the steam valves, should the governor belt break, or gearing give way, is omitted, because this feature with a late cut-off causes the shutting down of the engine under a heavy load when it is extremely desirable that the engine should run. The most certain substitute is the wheel governor, shown on the bracket, through which the horizontal shaft of the governor passes. The governor is connected to a trip which, when dislodged, causes the closing automatically of the emergency valve placed in the steam pipe above the throttle. This valve is nicely balanced and nearly frictionless.

This secondary governor is speeded when in action, five to seven per cent faster than the normal speed of the engine, and is very simple, for the governor wheel is simply a loose pulley with its belt, in its requirement of care under ordinary circumstances. The out-board bearing is of the same height as the crank bearing, and is constructed in the same manner, with adjustable bottom box.

Mr. Outerbridge's Work in Cast Iron.

Recognition of Mr. A. E. Outerbridge's investigations of the molecular changes taking place in cast iron under the influence of continued vibration has been made by the committee on Science and the Arts, of Franklin Institute, Philadelphia. A sub-committee consisting of C. J. Prince, Wm. R. Webster, Wm. C. Henderson, and Gus. Henning recommended the award to Mr. Outerbridge of the John Scott legacy premium and medal. In its report the sub-committee says that it confirmed the correctness of these observations and inferences by a series of experiments conducted in the foundry of the Camden Iron Works, the results of which are appended to the report. The committee says: "The fact that a certain molecular change takes place in cast iron in the course of time has been known and recognized for a long time, and that this change tends to relieve the internal strains and render the casting tougher, has often been noticed and acted on, although in a very crude way; but so far as the sub-committee has been able to learn, Mr. Outerbridge was the first to make a careful study of this and to note that the change may be hastened by impact, and the maximum strengthening effect produced in a short time, and also to make a scientific study of the phenomenon. Great credit is due to Mr. Outerbridge for the initial observation and the careful work dependent thereon. The results of his studies, given for the first time at the meeting of the American Institute of Mining Engineers (Feb. 20, 1896), have since attracted widespread interest and discussion, but nothing growing out of this has shown that any one, either in this country or abroad, has anticipated Mr. Outerbridge in this work."

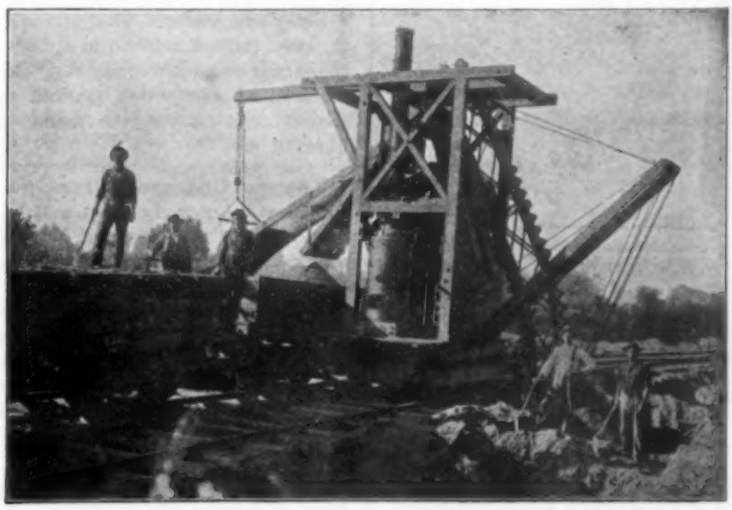
THE action of the Rockefeller managment in ordering from the Bethlehem Iron Co. steel forgings for parts of the machinery of the big freight steamer to be built by F. W. Wheeler & Co., of West Bay City, will undoubtedly result in steel forgings being adopted generally in the best lake vessels in the future. There is no doubt of advantage to be gained by the use of steel forgings in high-powered ships containing triple and quadruple expansion engines, and no place in the world are improvements in ships adopted more readily than on the lakes. Two years ago, there were no quadruple expansion engines or water tube boilers in freight steamers on the lakes. There are few freight steamers in the world equipped in this way, although it is admitted that the tendency in marine practice is undoubtedly in the direction of this kind of high power. Next season there will be eight or 10 6,000-ton freight carriers on the lakes that will have quadruple engines and water tube boilers, the latter of the Babcock & Wilcox type.—Marine Review.

JEFFREY SAND ELEVATOR AND SCREEN.

A Jeffrey portable sand elevator and screen is in use at the plant of R. L. Schoemaker & Co., Franklin Station, O., for digging and screening sand direct into the cars from the bank. It is shown in operation in the accompanying cut. The frame is made in two parts the lower or platform being mounted on truck wheels set to standard railroad guage, while the upper or main portion is pivoted on the lower one, giving it a complete radial adjustment. The machinery is mounted on the upper portion and consists of an elevator, screen engine, boiler and the necessary driving connections, including also an arrangement for propelling the whole by power. The elevator which digs its own load is of the continuous Jeffrey bucket type, the buckets being provided with truck wheels which travel on suitable guides in the angle iron ladder frame, thus reducing the friction as well as the wear to a minimum.

The elevator is pivoted at the top and is raised and lowered by means of hoisting drums, ropes, pulleys, etc., giving it a vertical adjustment, which, together with the radial adjustment, makes it possible to reach a large area of sand without moving the machine. The sand is delivered by the elevator upon the shaking screen, the finer product passing through the meshes into the car below which the coarser material is discharged over the end into a car on the next track.

The screen is also pivoted so the turning of the elevator



JEFFREY SAND ELEVATOR AND SCREEN.

within certain limits does not effect its relative location with the car. The screen is usually provided with two or more interchangeable sections of wire cloth so the size of the product can be varied to suit the market. Operations can be carried on by two men, one to look after the machinery, and the other after the supply to the cars and other details. The machine is practically automatic, requiring but little hand labor, except when cleaning up. Its capacity is from 10 to 15 cars per day at this plant, while with slight additional expense this can be doubled. The manufacturers are the Jeffrey Mfg. Co., of Columbus, O.

THE City of Chicago has awarded contracts for a 30,000,000-gallon pumping engine at the 14th st. station and a 14,000,000-gallon engine at the 68th st. station to the Holly Pump Co. The bid of the Lake Erie Engineering Works, of Buffalo, N. Y., was lower, City Engineer Erickson considers the Holly pumps better fitter for the work. The bids were: Holly Pump Co., $91,024 and $47,050. Lake Erie Engineering Works, $83,875 and $32,650. The Lake Erie Engineering Works may go into court about it.

THE Kelly Foundry & Machine Co., Goshen, Ind., has contracted for an addition to its foundry, 150x70 feet. It has also added to the machine shop, a building 65x70 feet. This, in addition to the present foundry, which is 175x70 feet, will give a large and complete plant.

BRITISH MECHANICAL SHORTCOMINGS.

While English writers in mechanical and trade journals are disposed to claim all that fairly belongs to British achievements, in invention and mechanics —often somewhat more— there are severe British critics of the unprogressive spirit that has brought out the United Kingdom behind in the race. A special committee sent to Germany by the corporation of Manchester, Eng., to investigate the cause of German inroads upon British trade, has passed some very severe strictures. Alderman Crossfield, one of the members, said: "The English workers are half savages when compared with the intelligent artisans of Germany." Councillor Pythian, a member of the Amalgamated Society of Engineers, remarked: "The engines and dynamos made in Germany put to shame most of the work in the English shops."

Commenting on the above, the *American Machinist* says: "We are not among those who think that England is to lose permanently her prominent place among industrial nations, but we think it is clear to any unprejudiced observer that in order to hold her place some advance steps must be taken, and we think they will be. Perhaps the best proof of this is to be found in the fact that there are Englishmen who do not hesitate to look facts squarely in the face and to vigorously express their opinions regarding them. Englishmen have the reputation of 'not knowing when they are whipped,' and while it is probably true that some changes in industrial methods will be forced upon them, it is certainly a mistake to suppose that England's industrial establishments are to be forced out of business by foreign competition.

"It is as clear as anything can well be, that Germany's older shop practice is based almost wholly upon English practice, and that her more modern shop practice is modelled upon American ideas. It is generally conceded that Germany's recent advance has been largely the result of frank criticism —particularly by Professor Renleaux—and there is no reason to suppose that similar frank criticism will not eventually have a similar effect in Great Britain."

THE plant of the Taylor Engine Co., of Chambersburg, Pa., was sold last week by the National Bank of Chambersburg, its owner, to William H. Derbyshire, of Philadelphia, and his brother Edward. The purchasers represent a number of capitalists, who will operate the plant under the corporate name of the Chambersburg Engineering Co. The incorporators are William H. Derbyshire, James Austin, John Leisenring Harrie B. Price and W. Harvey Irvine.

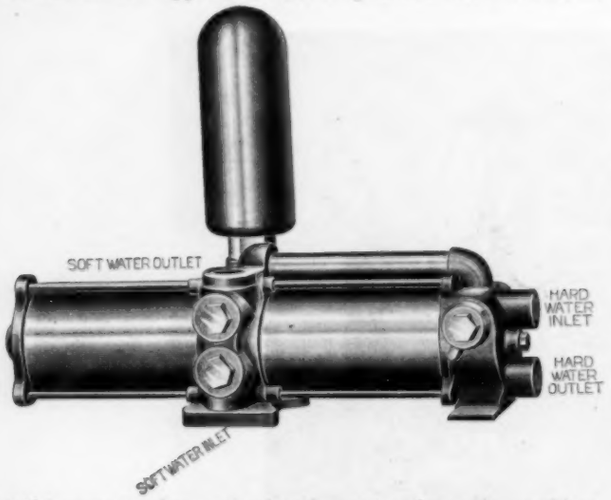
THE Kreps Foundry Co., Greenville, Pa., has received an order for 350 tons of architectural iron for a big school building in New York City.

IT is announced that the Portage Iron Works, at Duncansville, Pa., will add a wire nail mill having a daily capacity of 1,000 kegs.

THE HARTFORD WATER LIFT.

The automatic motor pump which is being put upon the market by the L. E. Rhodes Co., of Hartford, Conn., illustrates the high development which has been reached in small machinery of its class. It consists of two cylinders with two sets of valves and a common piston rod, one cylinder receiving the city water by the pressure of which the power is obtained, to operate the opposite cylinder acting as a double pump. By making the pump cylinder smaller than the power one a high pressure is obtained and city water may be forced and distributed through the pipes at a higher level than it would naturally flow; or cistern water may be raised by the city pressure; or in some instances (as in feeding mixed hard and cistern water to boilers) a combination of different liquids may be distributed.

The novelty of this lift lies in several points of design. The chamber for the pump valves acts as a partition between the two cylinders, with the piston passing through a deep stuffing box—the only one in the machine. By this method the working parts are brought compactly together and it is made possible to remove or change the pump cylinders without interfering with the piping or main body of the machine. Each lift is arranged to take three different sizes of pump cylinders and consequently by using an extra cylinder one size of lift can be varied to suit widely different conditions and purposes. This feature is appreciated not only in localities where the



shifting water pressure in the city mains demands machines with a great variation in the relative size of pump and power cylinders, but more especially by the trade handling these machines, which now needs only to carry perhaps a single lift to cover all the variations in size.

The cut-off valve is arranged to seat like a faucet at each stroke, giving absolute tightness and avoiding the wear which results where the packings pass back and forth over a series of small holes. Another feature is the placing of the working parts all in one line. This avoids any tendency to push the piston rod to one side, causing it to become worn or the stuffing box to leak, and adds to the efficiency and durability of the lift. Delicate springs, eccentrics etc., are avoided and there are no working parts on the outside. Large ways make the machine self-cleaning.

Spectrographic Analysis of Iron Ores.—[*Engineering*, Sept. 24]—Messrs. Hartley and Ramage give their researches in this line of study in a paper read before the Iron and Steel Institute. They examined the spectra of the flame from the converter in the basic Bessemer process, and photographed lines and bands which were found absent in the flame from the acid process, and yet could not be traced directly to the basic materials in the charge. The results showed the presence of traces of lead, silver, copper, gallium, and chromium, most of which are seldom in evidence in the materials employed. A careful study of the question showed that the most promising place to attack the problem was in the ores themselves, consequently a large variety were examined for their volatile metallic constituents. As some of the elements known to be present, such as vanadium, silicon, and titanium, are not volatile at the temperature of the Bessemer process, and others such as zinc and aluminum are hard to locate on account of their weak emissive powers, two lines of investigation had to be resorted to. The results here given, however, relate to those elements whose spectra could be photographed, and consequently would correspond to substances appearing in the Bessemer flame. Ninety-one specimens were examined, and the results tabulated in very complete form. The method of investigation was to take one-half a gramme of the ore, burn it with the oxy-hydrogen blow-pipe, and photographing the spectrum with the same apparatus employed for the spectrographic work of the Bessemer flame. The spectra were measured and the wave lengths of the lines determined; this combined with the photographs made, easily identified the elements which were present. An examination of the tables shows how varied the composition of the iron ores is, when an account is taken of minute quantities of metals not supposed to be there. We see such elements as sodium, potassium, rubidium, silver, copper, calcium, gallium, indium, thallium, nickel, chromium, and lead. Iron and also some manganese is of course very much in evidence. As the ores examined came from many parts of the world, their geological distribution in respect to the rarer metals is of interest. Thus, we see that the Bensburg and Pierrefite blends are richest in gallium, while those of Freiberg have the most indium. Lithium was also found in all the iron ores, but could not be photographed. The siderites had indium as a marked characteristic, while magnetites contained gallium. Older ores, such as bauxites, derived from basalt contain chromium, gallium, and nickel; this being also the case with the clay iron stones. Thallium is a rare occurrence in any of the ores, indium is found in pyrites. Red hematite ores were the purest of those examined. The paper is of exceeding interest in affording well marked indication of what may be looked for in studying the flame spectrum of the Bessemer blow. M.

Thermal Changes in Iron and Steel and Their Measurement.—[*Iron Age*, Oct. 21st.] Mr. C. Turner, in a paper read before the Society of Engineers of Western Pennsylvania, discusses the thermal conditions of iron and steel, and the measurement of the stresses by thermo-electric methods. Nearly every one is familiar with the fact that an India rubber band when stretched becomes heated, it is not so generally known, however, that iron when stretched becomes cooler. Yet such is the case, the theory being that substances which expand by heat grow colder when stretched, and *vice versa*. The author uses this law in the measurement of internal stresses, and finds that when the load is applied and the stress does not exceed five eighths of the commercial elastic limit (the drop of the beam), it can be quite accurately measured by the change in the temperature of the piece. The main portion of the paper interests only the structural engineer and need not be reviewed. Of general interest is the fact that the author in making the very delicate tests of the changes in temperature, used thermo-electric appliances. Melloni's antimony-bismuth thermopile, and a Thomson astatic reflecting galvanometer were employed, which made an exceedingly sensitive combination. A plate girder with stiffeners was loaded at the center, and the stresses in the various parts measured. Marked heating effects were obtained in the plate near all stiffeners, which denoted compression, and cooling effects in the center of all panels, which meant tension. A series of readings were taken in the top and bottom flanges of the girder, which showed that bridge building customs are correct in the method of using vertical stiffeners, but that the proportioning of flanges and spacing of rivets are somewhat in error. Thermal analyses of fibre stresses in columns were also made, and the conditions of elasticity observed. Within the limit of elasticity the temperature change should be proportional to the stress. This is best fulfilled within a considerable range by the most homogeneous steel, and partly so by commercial iron. The temperature change on removal of stress should equal, and be opposite to, the change produced by the application of the stress. The paper concludes with a description of the details in manipulating the thermo-electric apparatus and a discussion of the curves obtained by plotting the data. M.

THE Youngstown, O., rolling mills and steel works are running full this week with the exception of a few departments—the old nail mill in the case of the Brown-Bonnell Iron Co.

LAKE SUPERIOR MANGANESE ORES IN 1896.

The report of the U. S. Geological Survey on the production of manganese ores in the United States in 1896, has just appeared as part of the Mineral Resources literature of the Survey, and was prepared by John Birkinbine, who for so many years has prepared the iron ore monograph. The report shows the following production and values of manganese and manganiferous ores in this country last year:

	Quantity. Long tons.	Value.	Average value per ton.
Manganese ore	10,088	$ 90,727	$8 99
Manganiferous iron ore	338,713	726,413	2 14
Manganifer us silver ore	138,079	416,020	3 01
Manganiferous zinc ore	44,953	20,455	46
Total	531,832	$1,253,615	a $2 36

a Average.

This was a large gain over 1895, when the production of manganese ores was 9,547 tons and of manganiferous ores, 125,729 tons. The 1896 product of manganese ores was made up of 3,421 tons from Arkansas, 284 tons from California, 4,085 tons from Georgia, 2 tons from North Carolina, 265 tons from Pennsylvania, 2,018 tons from Virginia, and 13 tons from West Virginia. The manganiferous ores consisted of 9,072 tons of manganiferous iron ores from Colorado, and 329,640 tons from Lake Superior, 137,597 tons of manganiferous silver ores from Colorado and 482 tons from Montana, and 44,953 tons of manganiferous zinc ores from New Jersey. Concerning the Lake Superior production of manganiferous iron ores, which in 1896 was 217,000 tons more than in 1896 and 131,000 tons more than in 1895, the report says: "The Lake Superior iron ores which carry low percentages of manganese have but little added value on this account; in fact, this sometimes reduces the price which the iron ore commands, owing to the percentage of manganese being such that it would make a pig iron high enough in manganese to occasion an extra loss in converting into steel, and not sufficiently high to be of special advantage as an ore for making spiegeleisen. The quantity of iron ore obtained from the Lake Superior district which carries sufficient manganese to entitle it to be considered as manganiferous is large." Then follows a statement of the production since 1886. For 1896 the outputs from the six manganiferous ore properties, with the percentages of manganese are:

Tons.	Per cent Mang.	Tons.	Per cent Mang.
69,139	7.44	104,156	4.3
47,000	5.75	38,590	3.22
18,900	5	51,855	3.1
Total		329,640	

Limited amounts of iron ore considerably higher in manganese have come from a few mines on Lake Superior in other years. For example in 1894 one mine produced 7,140 tons of 18 per cent ore; in 1893 there was produced 5,051 tons averaging 10.4 per cent, 7,833 tons averaging 14 per cent and 300 tons averaging 22 per cent. The average percentage of manganese was less in 1896 than in preceding years.

English Iron Market Firm.

S. W. Royse & Co., of Manchester, Eng., in their review of the English iron market at the close of October, say: "The imports of iron ore continue to improve, the returns for the nine completed months of this year showing an increase in weight of 266,341 tons, and in value of £444,216 upon those for the corresponding period of 1896. There has latterly been a very firm tone in the pig iron market, notwithstanding the continuance of the dispute in the engineering trade. Shipments have been very heavy from Middlesbrough, with the end of the shipping season close at hand, and stocks have been reduced. Prices have advanced steadily, the total advance being some 1s. 4d. per ton in Scotch iron, and some 8d. per ton in Cleveland. At Middlesbrough a very considerable trade has recently been done, and the position is very strong, and prospects decidedly good. In the manufactured iron trade in the Midlands a good amount of new business has been arranged, and as makers were already well provided with orders, there is a strong tone in the market and a tendency to better figures."

—Top Mill furnace of the Wheeling Steel & Iron Co., Wheeling, W. Va., was blown in Nov. 1.

INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

The Smokeless Fuel Saving Stove Co. has been incorporated at New York City with a capital stock of $100,000, by W. D. Goodwin, 191 Broadway, Herman Schmidt, Fred. Girtanner, H. L. Bridges and others.

Milwaukee Steel Casting Co. has been incorporated at Milwaukee, Wis., for the operation of a steel casting plant at Greenfield ave. and Clinton st. It is specially equipped for casting gears, pinions, worm gears, cross heads, crank shafts, connecting rods, truck and car wheels, head blocks, hammer dies, motor and dynamo frames, etc.

The Taylor-Morris Co., of Janesville, Wis., has been incorporated, with a capital of $20,000, to build engines, m chine tools and principally a portable gasoline engine.

Robert C. Manville, William W. Manville and George H. Manville have incorporated the Manville Bros. Co., for the purpose of manufacturing and dealing in wire and metal shaping machinery, at Waterbury, Conn. They will also make single and double action power presses, screw thread rolling machinery and furnish a department for die and tool making in all their branches.

The Jeanesville Iron Works, of Jeanesville, Pa., has been incorporated with a capital of $200,000, by J. C. Hayden, Vernon H. Rood, A. Bartholomew, Samuel Garner, T. M. Morris.

The Standard Steam Specialty Co., of New York City, has been incorporated, with a capital of $15,000, and directors Herbert A. Joslin, Wm. H. Long, and Elbert Crandall, of New York City.

The Putnam Machine Tool Co., of Portland, Pa., has been incorporated, with $50,000 capital. The company will operate a factory at Portland, Northampton Co. The directors are Jonathan Moore, Mt. Bethel; J. I. Miller, Portland; W. C. Edgett, South Bridge, Mass.; Edwin L. Lewis, Philadelphia, and F. L. Hawe, Stonington, Conn.

At Warwick, Ga., a movement is on foot for the erection of a foundry and iron works. T. F. Warwick is connected with the enterprise.

The Boss Knitting Machine Works, Reading, Pa., will want a 50 h. p. to 60 h. p. engine and a 80 to 100 h. p. boiler; also a heating apparatus and exhaust fans for factory.

The McCay-Howard Engineering Co., 106 East German st., Baltimore, Md., will purchase a second-hand screw-cutting press and a second-hand foot punching press.

New Construction:—

Jonathan Matthews, of Harvey, Ill., has removed to South Bend, Ind., where he will erect a shop to engage in the boiler and repair business.

The American Wire Nail Co., Anderson, Ind., has contracted with the Haugh-Noelke Iron Works, Indianapolis, for the erection of two more buildings, needed by the company to increase its facilities.

The Case Mfg. Co., Columbus, O., owing to the increase of business in the crane department, is to build a new two-story steel and brick building, designed especially for the building of all kinds of cranes, to be 165 ft. long by 75 ft. wide. The New Columbus Bridge Co., of Columbus, O., has the contract for the steel work. Modern machinery throughout will be provided, to be operated by electricity.

The J. & E. Stevens Co., of Cromwell, Conn., toy manufacturer, has decided to rebuild its foundry building recently burned. The new buildings will be constructed as near fire proof as possible. The frame work will be steel, and the covering will be corrugated iron. The Berlin Iron Bridge Co., of East Berlin, Conn., has the contract. The main foundry portion is 40 ft. wide and about 200 ft. long. The trusses have a clear span. The sides have been designed so that the building is well lighted by large mullion windows. On the roof at suitable intervals are ventilators arranged with shutters so that they can be readily opened and closed. The cupola platform and floor is built of steel framework and covered with steel plates. Besides the foundry building proper, there are two small brick buildings having a steel roof, one a boiler shop and the other a plating room.

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FOR HEATING FEED WATER
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USED BY MANY OF THE LARGEST AND BEST PLANTS IN THE U.S.
HARRISON SAFETY BOILER WORKS
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MANUFACTURERS.
FOR PURIFYING EXHAUST STEAM
FOR TAKING WATER OUT OF STEAM.
COCHRANE SEPARATORS

Additions, Enlargements, Removals, Etc.:—

The Edward P. Allis Co., Milwaukee, Wis., is building an addition to its machine shop at the main works. It will be a one-story brick building, 106x150 feet, with a dome roof, to be used for finishing heavy engine work. A 30-ton Shaw electric traveling crane will run through the center, with 30 feet clearance from the floor to the lower line of the crane. There will be light from skylights as well as windows in the sides. The company is enlarging the South works foundry by adding a frame building, 87x275 feet. This will increase the molding capacity about 50 per cent. The new foundry will also have a 30-ton crane.

The Betts Machine Co., of Wilmington, Del., will enlarge its plant by the addition of a two story brick and iron building, 40x60 feet.

The Slaymaker-Berry Lock Works, at South Connellsville, Pa., is running very full and the erection of an addition is contemplated. A proposition to increase the capital stock from $175,000 to $250,000 is to be passed on at an early meeting of stockholders.

The Kelly Foundry & Machine Co., Goshen, Ind., has recently added a machine shop, 65x70 feet, to its plant, and has placed a contract for an addition to its foundry of 150x70 feet. This, in addition to the present foundry, which is 175x70 feet, will give the company a very large and complete plant.

Fires and Accidents:—

At Gallipolis, O., Oct. 5, the Kling Stove Foundry was partly destroyed by fire. The fire started from the ignition of a flask by a hot casting.

General Industrial Notes:—

Inability to make shipments to points in the yellow fever districts of the South caused the Belfont Iron Works and the Kelly Nail Works, of Ironton, O., to close down temporarily last week.

A new electric crane, just completed by the Morgan Engineering Co., of Alliance, O., has been placed in position at the Star Tin Plate Works, Pittsburg. It is of 15 tons capacity, 45 feet span, lift of 21 feet, and weight 58,000 pounds. The crane was placed in position, wired and ready for use in three and a half hours.

The Brightman Furnace Co., Cleveland, O., reports the following sales of Brightman stokers in the past month: Union Iron & Steel Co., Youngstown, O., eight; University of Illinois, Urbana, Ill., one; American Reduction Co., Philadelphia, Pa., two; Collins Farm Hospital, Collins, N. Y., three; Buffalo State Hospital, Buffalo, N. Y., two—fifth order, making 12 in all; Grant Ball Co., Cleveland, O., two. The company is now building several for England, Japan and Russia, and reports a decided increase in both domestic and foreign trade.

The Newport News Shipbuilding & Dry Dock Co., of Newport News, Va., is erecting at its ship yard a crane capable of lifting 140 tons. It is to be used to place engines, boilers and

The Totten & Hogg Iron & Steel Foundry Co., of Pittsburg, manufacturers of rolling mill engines, rolling mills and tin plate mills has just received an order from the United States Tin Plate Co., Demmler, Pa., to equip its mill with Freeman's patent furnace charger for annealing furnaces.

other machinery in the large war vessels under construction for the Government, and will be used also for placing on the sides of these vessels their armor plates, some single pieces of which weigh from 40 to 50 tons. The crane will have sufficient reach so that it will cover the entire width of a large cruiser. It revolves in a circle on a turn-table which is supported on a steel foundation about 25 ft. high. This foundation is to carry, besides its own weight, the weight of the crane, its machinery, and whatever load may be lifted, which altogether will aggregate 900 tons.

The Davis & Egan Machine Tool Co., of Cincinnati, has just been awarded a contract by the Government for one 30-inch lathe, four 18x6 engine lathes, and eight 25-inch standard drill presses.

Reference has been made in these columns to the organization of the Consolidated Pneumatic Tool Co., with offices in New York and shops at Frankford, Philadelphia, Pa., for the manufacture and sale of pneumatic stone cutting tools, pneumatic tools for caulking boilers and chipping metals, air compressors and complete compressed air equipment, and to the strong personnel of the company. In its announcement it calls attention to the broad patent privileges it owns, and to its facilities for the production of pneumatic tools of superior grade. The company has placed upon the market a patented pneumatic tool which is simple in design, devoid of valves, washers, springs or other complicated parts. It will be known as the "Consolidated." The company announces that its tools will be sold at low prices and that these will be maintained at as low a figure as is consistent with high grade material and workmanship.

It is reported that the acquisition by the Humbert Tin Plate Co., Connellsville, Pa., of the two-mill plant of the Stickney Iron Co., of Baltimore, under lease for three years postpones the erection of an addition recently spoken of as probable.

One of the largest hoisting engines ever built is now under construction at the plant of the Nordberg Mfg. Co., Milwaukee, Wis., for the copper mines of the Tamarack Mining Co., at Calumet, Mich. It is to be used in a vertical shaft 6,000 feet deep and is designed to lift a net load of 12,000 pounds at a speed of 3,500 feet per minute. The total load, consisting of cage, car of ore, rope, etc., is 42,000 pounds. The engine is a quadruple inclined Corliss, having a cylinder of 34 inches in diameter with a five-foot stroke. The reversing apparatus is operated by steam power, and the throttle valves and brakes will be so nicely adjusted that a child could easily move them, although it would require at least six men to do this work by hand. This machine is of entirely new design, being the first of the kind to be constructed. It is to be ready for delivery by February. The Nordberg Mfg. Co. is also building for the mining company an air compressor with six air cylinders, three being 27 inches and three 18 inches in diameter, and will be equivalent to about 700 h. p. The general plan of this machine is unique, as it is stated to be the first triple expansion compressor built in the United States. It acts in two stages, whereby power is saved. The triple expansion also eocnomizes fuel. It is expected by the improved construction and advanced practice to accomplish a

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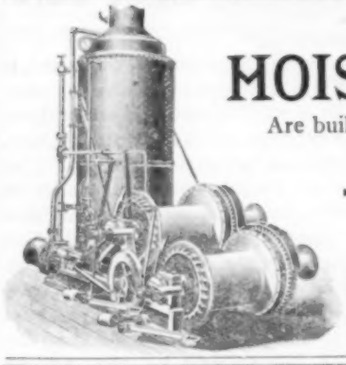
SAN FRANCISCO, John Woodlock, 26 Beale St.



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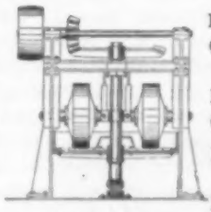

Grinding Pans.

Blast Furnaces,
Open Hearth Steel Furnaces,
Heating Furnaces,
Gas Producers, etc.
Iron and Brass Castings,
Bronze Tuyeres.

heavy reduction in the cost of compressing air. The Milwaukee company is also building for the Tamarack a surface condensing apparatus, with a capacity of 3,000 h. p.

The Salem Iron Co., Leetonia, O., is dismantling its four hot blast stoves and erecting three Kennedy hot blast stoves, 20x75 feet in size. The furnace is being relined also.

The plant of the Wilkes Rolling Mill Co., at Sharon, Pa., idle for several years, is being repaired and will be put in operation. The product is muck bar.

It is reported the owners of the rolling mill at Peoria, Ill., which has been idle for a long time, will build open-hearth steel furnaces and start the plant on steel hoops and cotton ties. A hoop mill is an important part of the works, having originally been built because Peoria is an extensive hoop market.

The Onondaga Steel Works, of the Sweets Mfg. Co., Syracuse, N. Y., are to be sold at auction under foreclosure Nov. 17. The plant consists of 15 heating furnaces, six hammers, eight trains of rolls and three steel cementing furnaces.

The Isabella Furnace Co., of Pittsburg, has blown in the third Isabella stack at Etna, Pa. All the furnaces of this concern are now in operation.

Pawling & Harnischfeger, 161 Clinton st., Milwaukee, Wis., are very busy in the manufacture of cranes and are also figuring on a great deal of new work. They have just shipped Zug & Co., Pittsburg, a seven-ton electric crane, and have the following noteworthy machines in course of construction: Consolidated Traction Co., Pittsburg, 45-ton three motor electric traveling crane; La Belle Iron Works, Wheeling, W. Va., one 20-ton and one five-ton electric crane; city of St. Louis, 30-ton electric crane for Bissell's Point Pumping station; Stillwell-Bierce & Smith-Vaile Co., Dayton, O., 20-ton hand traveling crane for power house Mechanicsville, N. Y.; Gillette & Herzog, Minneapolis, Minn., 15-ton hand traveling crane for bridge works.

The stockholders of the Lake Shore Iron Works, at Marquette, Mich., have voted to issue $30,000 worth of bonds. The plant will work full time again.

Car and locomotive orders, placed and prospective, according to the *Railway Age*, are as follows: The Centralia & Chester Ry. has placed an order with the St. Charles Car Co., for 100 coal cars and with the Rogers Locomotive Co. for two locomotives; the Metropolitan Elevated of Chicago, has ordered 25 coaches from the Pullman works, the F. & P. M. Ry. has bought two locomotives of the Brooks Locomotive Works; the Saunki Ry., of Japan, has bought one locomotive of Brooks; the Rio Grande Western Ry. has ordered four engines of the Baldwin Locomotive Works; the Wabash, Mis-

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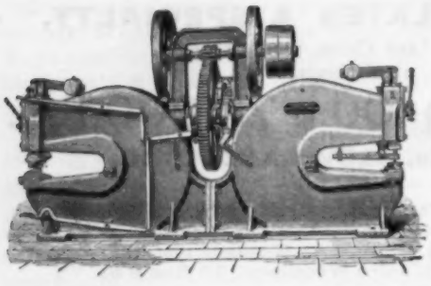

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souri Pacific and Missouri, Kansas & Texas roads are taking bids on locomotives at St. Louis; the Astoria & Columbia River Ry. has ordered three engines of the Cooke Locomotive Works, and the same works have an order for five locomotives from the Oregon R. R. & Navigation Co., and two to go to Japan; the Duluth, Missabe & Northern is figuring on some new ore cars, the Cudahy Packing Co., of S. Omaha, Neb., for 200 refrigerator cars, the Grand Trunk for 18 locomotives, the Minneapolis & St. Louis for 200 box cars, and the Chicago & West Michigan for 500 to 600 freight cars.

The record for drawing wire was broken a few days since at the plant of the Oliver Wire Co., on the South Side. In 24 hours' time 1,487 tons of wire, reckoned on one-hole drawing, was turned out.

In connection with its purchase by a syndicate, the J. I. Case Threshing Machine Co., of Racine, Wis., has recently made a complete change in its management, by electing the following officers: President, Frank K. Bull; vice-president, Frederick Robinson; secretary, Richard T. Robinson; treasurer, Chas. L. McIntosh. Mr. Bull, the new president, has been for many years treasurer of the company, and has been connected with the firm for over 20 years. The company will continue the manufacture of gasoline engines of from one to 100 h. p., as heretofore, as well as of its general line of all classes of agricultural machinery.

The Bristol Furnace of the Bristol (Tenn.) Iron & Steel Co., the recent sale of which to the Home Iron Co., of Bristol, was annulled by the Supreme Court of Virginia, will be again offered for sale Dec. 1. It is understood that the Home Iron Co. has bought about $100,000 of claims against the Bristol Iron & Steel Co.

The small mill of the Lukens Iron & Steel Co., at Coatesville, Pa., which was burned Oct. 4, has been rebuilt by the Pennsylvania Steel Co. The new building has a steel frame covered with corrugated iron.

It is stated that the plan for raising fresh capital for the Pennsylvania Steel Co. will not be promulgated before Jan. 1.

The Brown Hoisting & Conveying Machine Co., Cleveland, is erecting for Fried. Krupp & Son's, Rheinhausen blast furnace, at Essen, Germany, a complete plant of standard ore bridges, driven by electric motors, a duplicate of the Carnegie plant, but smaller. For the Krainische Industrie Gesellschaft, at Trieste, Austria, the Cleveland company has just completed a plant of standard ore bridges for unloading ships and loading the ore into cars for shipment to the above works, which are located at Krain, Austria. For the Maripol Steel Works, Maripol, Russia, it is building a standard 30-ton electric traveling crane. For Mitsui & Co., Kobe, Japan, it has just sent two 5-ton traveling cranes for foundry use. For the Acajutla Wharf Co., San Salvador, it has shipped six three-ton jib cranes; also to La Union, Central America, a standard 15-ton pillar crane, besides many smaller orders all over Europe.

At Martin's Ferry, O., employes at the Wheeling Steel & Iron Co.'s blast furnaces received an increase of 10 per cent in wages last week.

The Ensign Mfg. Co., Huntington, W. Va. has received an order for 500 box cars from the Norfolk & Western.

W. J. Rainey is building 200 new coke ovens at Mt. Braddock, Pa.

The Bear Spring Furnace in Stewart Co., Tenn., capacity 5,000 tons a year of cold blast charcoal iron, is about to resume.

The W. Dewees Wood Co., McKeesport, disavow any intention of leasing the plant of the Columbia Iron & Steel Co., Uniontown, Pa. Efforts are being made in other directions, however, to secure these works.

The Braeburn Steel Co., at Braeburn, Pa., on the Allegheny Valley Road, is about ready to begin operations. Fine tool steel and bars for springs, machinery, etc., will be specialties.

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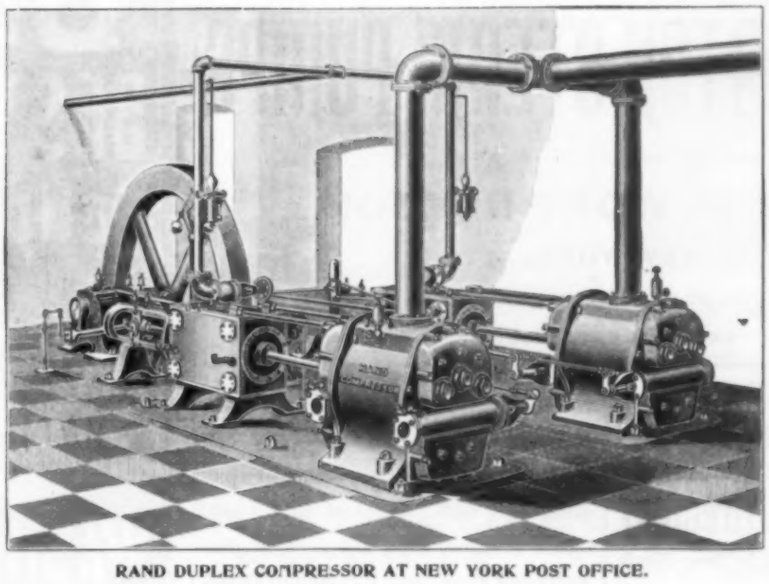

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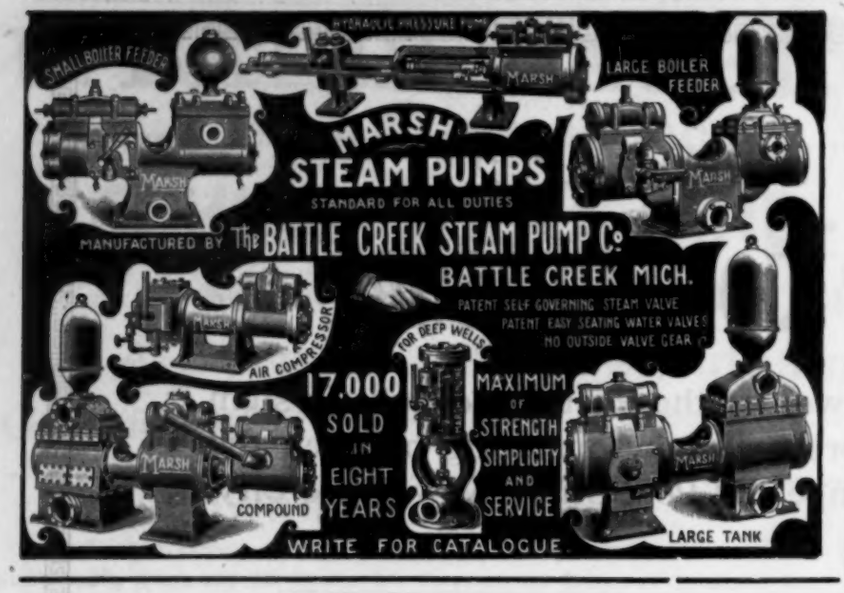

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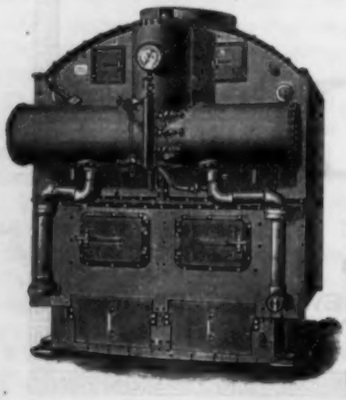

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Salem and Pittsburg	* 8:00 am	* 8:30 pm
Pittsburgh, Bellaire and East	† 3:15 pm	† 6:25 pm
Philadelphia and New York	* 1:40 pm	*11:25 am
Baltimore and Washington	* 1:40 pm	*11:25 am
Alliance and Pittsburgh	* 1:40 pm	*11:25 am
Ravenna and Alliance	* 5:00 pm	* 8:40 am
Philadelphia and New York	*11:10 pm	* 4:30 am
Baltimore and Washington	*11:10 pm	* 4:30 am
Alliance and Pittsburgh	*11:10 pm	* 4:30 am

Mt. Vernon and Pan-Handle Route

FROM CLEVELAND TO	LEAVE	ARRIVE
Xenia and Cincinnati	* 8:50 am	* 5:30 pm
Akron and Columbus	* 8:50 am	* 5:30 pm
Akron and Columbus	† 1:40 pm	†12:10 pm
Col. Cin. Ind. & St. L.	‡ 9:00 pm	* 7:30 am
Col. Cin. Ind. & St. L.	‡ 11:20 pm	

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Akron, Canton & Valley Jct	*10:00 A M	*3:30 P M
Akron, Canton & Chicago	*8:10 A M	*6:35 P M
Akron, Canton & Wooster, Defiance, Garrett, Marietta, Wheeling, Washington, D. C., and Baltimore	†2:25 P M	†11:00 A

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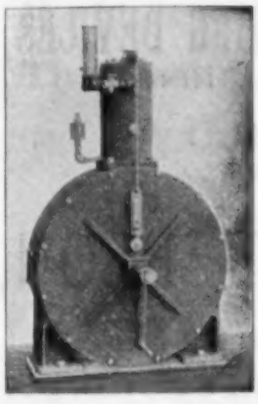

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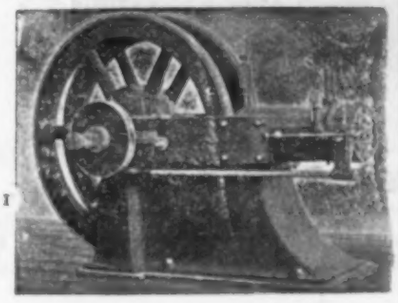

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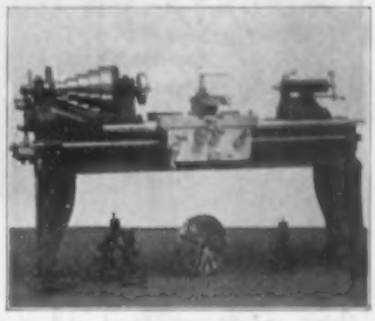

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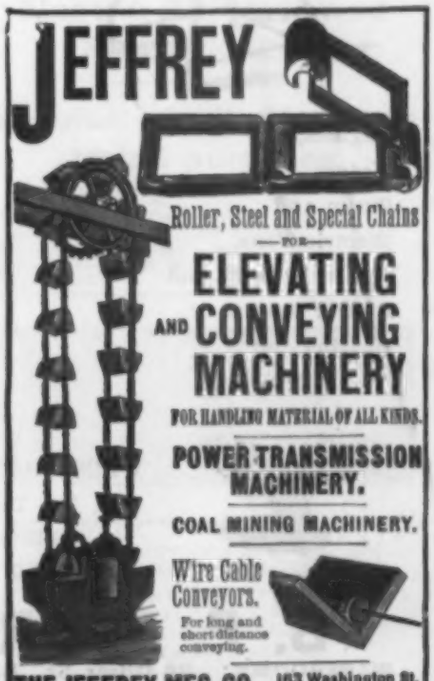

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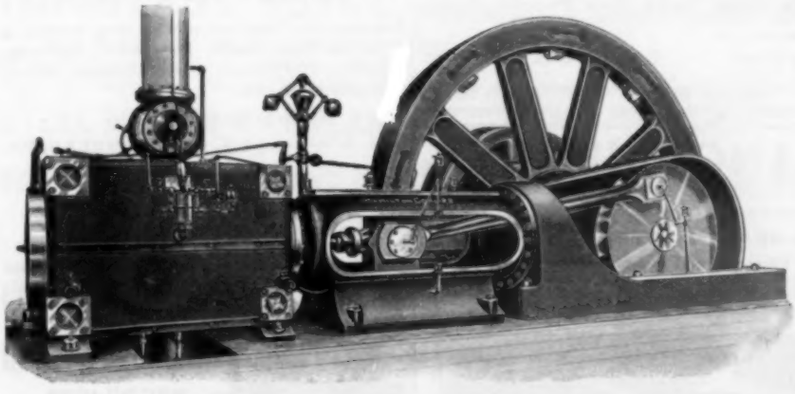

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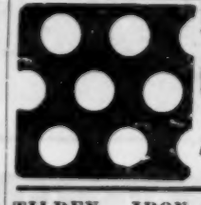

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The Ingersoll-Sergeant Drill Co., New York.

Rolling Mill Machinery—
The Lloyd Booth Co., Youngstown, O.

Roofs—
Shiffler Bridge Co., Pittsburg.

Sand and Chill Rolls—
The Lloyd Booth Co., Youngstown, O.
Lorain Foundry Co., Lorain, O.
Seaman, Sleeth Co., Pittsburg, Pa.

Saws—
Peter Gerlach & Co., Cleveland.

Screens for Coal Ore, Etc.
Robt. Aitchison Perforated Metal Co., Chicago.
Harrington & King Perforating Co., Chicago.
Jeffrey Mfg. Co., Columbus, O.

Screws—
C. H. Besly & Co., Chicago, Ill.
Upson Nut Co., Cleveland, O.
Chicago Screw Co., Chicago, Ill.

Semi-Steel—
The King & Andrews Co., Chicago, Ill.

Shafting—
The Lane & Bodley Co., Cincinnati, O.

Shearing and Punching Machinery—
Bertsch & Co., Cambridge City, Ind.
Toledo Machine & Tool Co., Toledo, O.
Long & Allstatter Co., Hamilton, O.
Perkins Machine Co., Boston, Mass.
Fox Machine Co., Grand Rapids, Mich.

Sheet Iron—
Cleveland Rolling Mill Co., Cleveland.
Ætna-Standard Iron & Steel Co., Bridgeport, O.
E. H. Stroud & Co., Chicago, Ill.

Special Machinery—
Toledo Machine & Tool Co., Toledo, O.
Edwin Harrington Son & Co., Philadelphia.
Perkins Machine Co., Boston, Mass.

Steam Boiler Inspectors—
Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn.

Steam Pipe and Boiler Covering—
C. H. Besly & Co., Chicago, Ill.

Steam Packing—
C. H. Besly & Co., Chicago, Ill.

Steam Shovels and Dredges—
The Bucyrus Co., South Milwaukee, Wis.
Marion Steam Shovel Co., Marion, O.

Steam Specialties—
C. H. Besly & Co., Chicago, Ill.

Steel—
Otis Steel Co., Cleveland, O.
Miller, Wagoner & Bentley, Chicago, Ill.
E. H. Stroud & Co., Chicago, Ill.

Steel Castings—
W. H. Bosworth, Cleveland, O.
The King & Andrews Co., Chicago, Ill.
Otis Steel Co., Cleveland, O.

Steel Rails, Blooms and Billets—
Cleveland Rolling Mill Co., Cleveland
Bethlehem Iron Co., South Bethlehem,
Cambria Iron Co., Johnstown, Pa.

Steel Stamps and Stencils—
J. H. Ficharty & Co., Cleveland.

Stokers—
Playford Stoker Co., Cleveland, O.
Brightman Furnace Co., Cleveland, O.
Westinghouse, Church, Kerr & Co., New York City.

Tanks—
Enterprise Boiler Co., Youngstown, O.
Meehan Boiler & Construction Co., Lowellville, Ohio.

Tinning Machinery—
W. H. Bosworth, Cleveland, O.
The Lloyd Booth Co., Youngstown, O.

Tin Plate—
Ætna-Standard Iron & Steel Co., Bridgeport, O.

Tin and Terne Plates—
B. P. Crane & Co., Chicago, Ill.
E. H. Stroud & Co., Chicago, Ill.

Tool Steel—
C. H. Besly & Co., Chicago, Ill.

Transmission Machinery—
Link-Belt Machinery Co., Chicago, Ill.
The Lane & Bodley Co., Cincinnati, O.
Jeffrey Mfg. Co., Columbus, O.

Tube Welding—
S. Fix Sons, Cleveland.

Turnbuckles—
Cleveland City Forge & Iron Co., Cleveland.
W. H. Bosworth, Cleveland, O.

Twist Drills—
C. H. Besly & Co., Chicago, Ill.

Valves—
C. H. Besly & Co., Chicago, Ill.
Jenkins Bros., New York City.
The Lunkenheimer Co., Cincinnati, O.

Ventilating Fans—
B. F. Sturtevant Co., Boston Mass.

Wheelbarrows—
Akron Cultivator Co., Akron, O.
Lansing Wheelbarrow Co., Lansing, Mich.

Wire Machinery—
John Adt & Son New Haven Conn.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, Ohio.
Wm. Glader, Chicago, Ill.

Wire Nail Machinery—
Wm. Glader, Chicago, Ill.

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Reynolds Corliss Engines.

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WE DO IT CHEAP.

Established 1836.

Having recently installed a new and modern Plant, we are prepared to do all kinds of

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and solicit correspondence from any manufacturer or anyone having goods to be galvanized. Prompt and excellent work assured. Prices low, considered.

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Manufacturers and Jobbers of Housefurnishing Hardware, Metals, Etc.

Alphabetical List of Advertisers.

The star (*) indicates that the adv. appears alternate weeks: the dagger (†) once a month; the double dagger (‡) once in three weeks; the parallel (‖) three times out of four.

	PAGE
Adt & Son, John	27
Ætna-Standard Iron & Steel Co	26
Aitchison, Rob't Perforated Metal Co	31
Akron Cultivator Co	31
Allis & Co., Edward P	30
Almy Water Tube Boiler Co	22
Apollo Iron & Steel Co	1
Automatic Circuit Breaker Co	25
Bacon, Earle C	27
Baird Machinery Co	20
Beckley & Co., A. J	26
B. & O. R. R	21
Battle Creek Steam Pump Co	22
Besly & Co., C. H	36
Bethlehem Iron Co	35
*Berger Mfg. Co	—
*Bertsch & Co	—
Bickford, H	36
Booth Co., The Lloyd	34
Bosworth W. H	27
Bourne-Fuller Co	26
Brightman Furnace Co	32
*Brown, Edward	23
Bucyrus Steam Shovel & Dredge Co	24
Cahall Sales Department	1
Cambria Iron Co	26
Card Electric Co	35
Case Mfg. Co	1
Central Electrotype & Engraving Co	2
Charter Gas Engine Co	36
Chicago & Northwestern Ry	33
Chicago Screw Co	1
Clayton Air Compressor Works	2
Clay Co., Oliver P	1
Clearfield Fire Brick Co	35
Cleveland & Buffalo Transit Co	33
Cleveland City Forge & Iron Co	1
Cleveland Electrotype Co	35
*Cleveland Galvanizing Works	—
Cleveland Rolling Mill Co	26
Clinton Iron & Steel Co	26
*Clonbrock Steam Boiler Co	—
*C. M. & St. P. Ry	—
Cole, J. Wendell	36
Crane & Co., B. P	35
Detroit & Cleveland Steam Navigation Co	33
*Diamond Fire Brick Works	20
Dickman & MacKenzie	1
*Dietz, Schumacher & Boye	23
Dixon, Jos. Crucible Co	32
Dover Fire Brick Co	35
Emmerton, F. A	2
Enterprise Boiler Co	1
Eriksou, Edward E	20
*Fix Sons	—
Fleharty, J. H. & Co	2
Forster, Waterbury & Co	1
Fox Machine Co	36
Frick Coke Co., H. C	1
†Fulton Steam Boiler Wks. & Fdy. Co	—
Gates Iron Works	2
Gerlach, Peter & Co	35
Glader, Wm	2
Gobeille Pattern Co	31
Hanna & Co., M. A	26
Harrington & King Perforating Co	36
Harrington, Son & Co., Edwin	36
Harrison Safety Boiler Works	17
Hartford Steam Boiler Insp. & Ins. Co	35
Haselton Boiler Co	23
Heyl & Patterson	24
Hooven, Owens & Rentschler Co	25
Illinois Central R. R	—
Ingersoll-Sergeant Drill Co	2
Iron Clad Paint Co	31
Jeffrey Mfg. Co	23
Jenkins Bros	31
Jones Foundry Co., W. A	1
King & Andrews Co	19
Lane & Bodley	31
Lansing Wheelbarrow Co	31
Lake Superior Consolidated Iron Mines	26
Lidgerwood Mfg Co	19
Link-Belt Machinery Co	32
*Lodge & Shipley Machine Tool Co	23
Long & Allstatter Co	20
Lorain Foundry Co	1
Lunkenheimer Co., The	34
Magnolia Metal Co	1
Marine Iron Works	20
Marion Steam Shovel Co	35
Meehan Boiler & Construction Co	36
Miller, Wagoner & Bentley	2
Millers Falls Co	36
Moore Mfg. Co	1
National Engraving Co	22
Nolte Brass Co	2
North American Metaline Co	36
Norwalk Iron Works Co	2
Nuttall Co. The R. D	25
Oglebay, Norton & Co	36
†Ohio Sand Co	—
Otis Steel Co	19
Perkins Machine Co	35
Phillips Testing Laboratory, The	23
Pickands, Brown & Co	2
Pierce-Crouch Engine Co	23
Pittman, C. K	2
Pollock, Wm. B. & Co	2
Playford Stoker Co	34
Rand Drill Co	2
Rand, Chas. F., Prest	26
Reading Crane & Hoist Works	22
Reese, Hammond & Co	36
Rockwell & Co., W S	32
Rogers, Brown & Co	36
Seaman, Sleeth Co	26
‖Sharon Fire Brick Works	1
Sharpsville Foundry and Machine Co	19
Shiffler Bridge Co	26
Shultz Belting Co	1
Sidney, Shepard & Co	30
Sterling Emery Wheel Mfg. Co	33
Stilwell-Bierce & Smith Vaile Co	2
Stroud & Co., E. H	2
Stuart Fire Brick Co	32
Sturtevant Co., B. F	1-24
Sykes Iron Roofing Co	34
Tabor Mfg Co	23
Textor, O	2
Tod, Wm. & Co	34
Toledo Machine & Tool Co	35
Wm. C. Thayer	27
Turner, Vaughn & Taylor Co	27
Union Mining Co	19
Unson Nut Co	1
Westinghouse Electric & Mfg. Co	29
Westinghouse, Church, Kerr & Co	23
Wormer Machinery Co	27
Worthington, Henry R	22
Wellman Seaver Engineering Co	36

IRON AND STEEL MARKETS.

IRON ORE.

[On Lake Erie docks.]

Special low-phosphorus hard Ore, Bessemer	$3 40@ 3 45
No. 1 Specular, Bessemer	3 25@ 3 30
No. 1 Bessemer hematite	2 60@ 2 70
Hematites No. 1 non-Bessemer	2 00@ 2 25
No 1. Specular, non-Bessemer	2 40@ 2 60

PIG IRON.

CLEVELAND (f. o. b. cars):	
Bessemer	$10 50@ 10 75
No. 1 Strong Foundry	10 00@ 10 75
No. 2 Strong Foundry	10 15@ 10 25
No. 1 Gray Forge, red short	9 75
No. 2 Gray Forge, mottled	9 50
No. 1 American Scotch	10 65@ 10 90
No. 2 American Scotch	10 15@ 10 40
Lake Superior Charcoal	12 25@ 12 50
PITTSBURG:	
No. 1 Foundry	$11 00@ 11 25
No. 2 Foundry	10 65@ 10 90
Gray Forge	9 75 10 00
White and Mottled	9 50
Warm Blast Charcoal	13 00@ 13 50
Cold Blast Charcoal	16 00
Bessemer	9 90@ 10 10
CHICAGO:	
Lake Superior Charcoal	$12 50@13 00
Local Coke Foundry No. 1	11 50@ 12 00
Local Coke Foundry No. 2	11 00@ 11 50
Local Coke Foundry No. 3	10 50@ 11 00
Local Scotch Foundry No. 1	11 50@ 12 00
Local Scotch Foundry No. 2	11 00@ 11 50
Local Scotch Foundry No. 3	10 50@ 11 00
Southern Coke No. 1	11 00@ 11 25
Southern Coke No. 2	10 60@ 10 85
Southern Coke No. 3	10 35@ 10 60
Southern No. 1 Soft	11 00@ 11 25
Southern No. 2 Soft	10 60@ 10 85
Southern Silveries	11 25@ 11 50
Jackson Co. Silveries	13 50@ 14 50
Ohio Silveries No. 1	@
Ohio Strong Softeners	12 00@ 12 25
Alabama Car Wheel	16 00@ 17 00
Malleable Bessemer	10 75@ 11 00
Coke Bessemer	11 50@ 12 00
CINCINNATI (reported by Rogers, Brown & Co.)	
Southern Coke No. 1, Foundry	$ @ 10 00
Southern Coke No. 2 and No. 1 Soft	9 50@ 10 00
Hanging Rock Coke, No 1	12 50@ 13 50
Hanging Rock Charcoal No. 1, Fdy	14 50@ 15 50
Tennessee Charcoal No 1	12 50@ 13 00
Jackson County Silvery No 1	12 50@ 13 00
Southern Coke, Gray Forge	8 25@ 8 50
" " Mottled	8 25@ 8 50
Standard Georgia Car Wheel	14 25@ 15 00
Tennessee " "	13 00@ 14 00
Lake Superior " "	14 75@ 15 85
BUFFALO:	
No. 1 Foundry Strong Coke Iron Lake Superior Ore	11 25
No. 2 Foundry Strong Coke Iron Lake Superior Ore	10 75
Ohio Strong Softener No. 1	11 75
Jackson Co. Silvery No. 1	14 00
Lake Superior Charcoal	15 50
Southern Soft No. 1	11 75
Hanging Rock Charcoal	17 00
ST. LOUIS:	
Southern Coke No 1	$ 9 50@ 9 75
Southern Coke No. 2	9 00@ 9 25
Southern Coke No. 3	8 50@ 8 75
Southern Gray Forge	8 00@ 8 25
Southern Charcoal No. 1	13 00
Missouri Bessemer	12 00
Ohio Softeners	13 50
Lake Superior Car Wheel	14 50
Southern Car Wheel	14 50

OLD RAILS AND SCRAP METAL.

[Delivered Cleveland.]	Gross Tons
Old iron rails	$14 00
Old steel rails (6 ft. and over)	10 50
Old steel rails (6 ft. and under)	10 00
Old car wheels	11 00
	Net Tons
No. 1 R. R. wrought scrap	$11 50
Mill scrap	8 50
No. 1 Machine cast scrap	8 00
Iron axles	15 00
Axle turnings	8 00
Wrought turnings (free from cast)	6 50
Cast borings	5 25
Uncut wrought iron boilers	3 50
Steel boiler plates	8 00
Grate bars	5 25
Pipes and flues (clean)	7 50
Tank iron	7 00
Hoop and band iron	6 50
Sheet iron	5 00
Wrought drillings	6 00
Malleable iron	8 50

STRUCTURAL MATERIAL.

Beams and Channels (f. o. b. Cleveland)	1.15¢
Angles	1.15¢
Tees	1.25¢
Universal Plates	1.15@1.20¢
Sheared Plates	1.20¢

MERCHANT IRON AND STEEL.

[Less than car-lots, Cleveland.]

Rounds and Squares.—Bar Iron.

1 to 1½	1.10 Base.
2 to 2½	.20 extra.
3 to 3½	.50 "
3½ to 4	.70 "
4½ to 4½	1.00 "
4½ to 5	1.30 "
5½ to 6	1.80 "
6½ to 6½	2.20 "

6¾ to 7⅛	.30 extra.
¾ to ⅞	.10 "
¾ to 13-16	.20 "
¾ to 9-16	.30 "
7-16 to 15-32	.40 "
⅜ to 13-32	.50 "
6-16 to 11-32	.70 "
¼ to 9-32	.90 "
7-32	1.40 "
3-16	2.50 "

Flats—Bar Iron.

1¼ to 4 x ⅜ to 1	1.05 Base.
4¼ to 6 x ⅜ to 1	.10 extra
6¼ to 8 x ⅜ to 1	.60 "
8¼ to 10 x ⅜ to 1	.80 "
1¾ to 4 x 1 1-16 to 1½	.30 "
4¼ to 6 x 1 1-16 to 1½	.40 "
6¼ to 8 x 1 1-16 to 1½	.60 "
8¼ to 10 x 1 1-16 to 1½	.90 "
2 to 4 x 1¾ to 2	.50 "
4¼ to 6 x 1¾ to 2	.60 "
6¼ to 8 x 1¾ to 2	.80 "
8¼ to 10 x 1¾ to 2	1.00 "
2 to 4 x 2⅛ to 3	.60 "
4¼ to 6 x 2⅛ to 3	.80 "
6¼ to 8 x 2⅛ to 3	1.00 "
1¾ to 1¾ x ⅜ to 1	.10 "
1 to 1 1-16 x ⅜ to ⅞	.20 "
¾ to 15-16 x ⅜ to ⅞	.40 "
⅜ to 11-16 x ⅜ to ⅞	.50 "
¼ to 9-16 x ⅜ to ⅞	.90 "

Heavy Band Iron.

7 to 10 x ¼ to 5-16	.70 extra.
6¼ to 6¾ x ¼ to 5-16	.50 "
4¼ to 6 x ¼ to 5-16	.30 "
1¾ to 4 x ¼ to 5-16	.20 "
1 to 1⅜ x ¼ to 5-16	.30 "
¾ to 15-16 x ¼ to 5-16	.50 "
⅜ to 11-16 x ¼ to 5-16	.80 "
⅛ to 9-16 x ¼ to 5-16	1.00 "
¾ to 7-16 x ¼ to 5-16	1.50 "

Heavy bands, 7-32 in. thick 1-10 c. per lb. higher than ¼ to 9-16 thick. **Bevel Edge Shaft Iron** 1-10 higher than same size of Heavy Bands.

Light Band Iron.

7 to 10 x No. 9 to 3-16	.90 extra.
7 to 10 x Nos. 10, 11 and 12	1.00 "
6¼ to 6¾ x No. 9 to 3-16	.70 "
6¼ to 6¾ x Nos. 10, 11 and 12	.80 "
4¼ to 6 x No. 9 to 3-16	.50 "
4¼ to 6 x Nos. 10, 11 and 12	.60 "
1¾ to 4 x No. 9 to 3-16	.40 "
1¾ to 4 x Nos. 10, 11 and 12	.50 "
1 to 1 3-16 x No. 9 to 3-16	.50 "
1 to 1 3-16 x Nos. 10, 11 and 12	.60 "
13-16 to ⅞ x No. 9 to 3-16	.60 "
13-16 to ⅞ x Nos. 10, 11 and 12	.70 "
11-16 to ¾ x No. 9 to 3-16	.80 "
11-16 to ¾ x Nos. 10, 11 and 12	.90 "
9-16 to ⅝ x No. 9 to 3-16	1.00 "
9-16 to ⅝ x Nos. 10, 11 and 12	1.10 "
7-16 to ½ x No. 9 to 3-16	1.30 "
7-16 to ½ x Nos. 10, 11 and 12	1.40 "
⅜ x No. 9 to 3-16	1.50 "
⅜ x Nos. 10, 11 and 12	1.60 "

Bevel Edge Box Iron.

Same as Light Bands, of same sizes.

Beaded Band Iron, 1¼ in. to 2 in.

Sand Band Iron, 1-10 c. above same sizes of Light Bands.

Oval Iron.

⅜ to 1⅜	.40 extra.
¾ to 13-16	.50 "
⅝ to 11-16	.60 "
½ to 9-16	.80 "
⅜ to 7-16	1.10 "
½ to 9-16 x 3-16	1.60 "
⅜ to 11-16 x ⅛	1.20 "

Half Oval and Half Round.

2¼ to 3	.60 extra.
⅜ to 2	.50 "
¾ to 13-16	.70 "
⅝ to 11-16	.90 "
½ to 9-16	1.20 "
⅜ to 7-16	2.50 "
5-16	3.50 "
¼	4.50 "

Half Ovals less than ¼ their width in thickness, extra price.

Horse Shoe Iron.

All sizes..... 1 c. extra.

Cutting ordinary bars to specified length, .20 to .30 extra, according to length and size.

Steel Bands.

Width In Inches.	English Standard Gauge.	
1 1-2 to 6,	Nos. 7, 8, 9 or 3-16"	1.50 Base.
		Extras.
1⅜ to 6,	" 10, 11, 12 or ¼"	.05 per 100 lbs.
1 to 1¾,	" 7, 8, 9 or 3-16"	.10 "
1 to 1¾,	" 10, 11, 12 or ¼"	.15 "
13-16 and ⅞,	" 7, 8, 9 or 3-16"	.20 "
13-16 and ⅞,	" 10, 11, 12 or ¼"	.25 "
11-16 and ¾,	" 7, 8, 9 or 3-16"	.30 "
11-16 and ¾,	" 10, 11, 12 or ¼"	.35 "
9-16 and ⅝,	" 7, 8, 9 or 3-16"	.40 "
9-16 and ⅝,	" 10, 11, 12 or ¼"	.45 "
½,	Nos. 7, 8, 9 or 3-16"	.55 "
½,	" 10, 11, 12 or ¼"	.60 "
7-16	" 7, 8, 9 or 3-16"	.75 "
7-16	" 10, 11, 12 or ¼"	.85 "
⅜,	" 7, 8, 9 or 3-16"	.95 "
⅜,	" 10, 11, 12 or ¼"	1.05 "

Iron and Steel Hoops.

Width in Inches.	English Standard Gauge.	
1 7-16 to 3	Nos. 13, 14, 15 and 16	1.50 Base,
		Extras
1 7-16 to 2,	" 17, 18, and 19	.05 per 100 lbs.
1 7-16 to 2,	" 20	.10 "
1 7-16 to 2,	" 21	.15 "
-16 to 1¾,	" 22	.25 "
to 1¾,	" 13, 14 and 15	.05 "
1¾,	" 16, 17 and 18	.10 "

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NO HOLES DRILLED INTO IT ALL PARTS CLAMPED ON.

Perfect Forward Dump.
Strongest, Easiest Handled.
Lightest and Most Durable.

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MANUFACTURERS, Akron, Ohio.

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Special hand-made pig iron barrows.

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There is a vast deal in familiarity with the type and phrase in which a manufacturer makes himself known to the advertisement reader, just as the personal acquaintance of his traveling salesman gets him a hearing when a strange face and a strange voice are bowed out with a "busy day's" courtesies.

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And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green, and now owned by this Company.

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USED BY NEARLY ALL THE RAILROADS.

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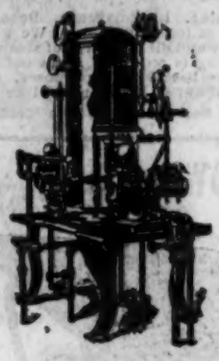
CHICAGO, U. S. A.

Modern Methods as applied to the handling of Iron Ore, Coal, Raw and Manufactured Products.

Manila Rope, Power Transmissions, Shafting, Pulleys, Shaft Bearings, Gearing Friction Clutches, etc.



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WE BUILD FURNACES OF ALL KINDS. SATISFACTION GUARANTEED.

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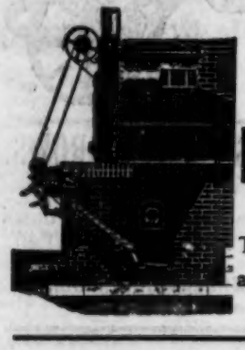

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THE MOST ECONOMICAL IN FUEL

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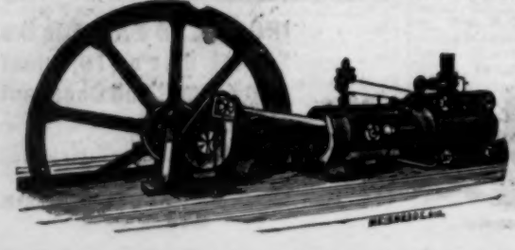

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ALL SIZES.

Simple and Compound.

Shafting, Hangers, Pulleys.

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1⅛ to 1¾,	"	19 and 20	.15 per 100 lbs.
1¼ to 1¾,	"	21	.20 "
1¼ to 1⅞,	"	22	.30 "
15-16 and 1,	"	13, 14 and 15	.10 "
15-16 and 1,	"	16, 17 and 18	.15 "
15-16 and 1,	"	19 and 20	.20 "
15-16 and 1,	"	21	.25 "
15-16 and 1,	"	22	.35 "
⅞, Nos.	13, 14 and 15		.20 "
⅞, "	16, 17 and 18		.25 "
⅞, "	19 and 20		.30 "
⅞, "	21		.35 "
⅞, "	22		.45 "
¾ and 13-16 Nos.	13, 14 and 15		.30 "
¾ and 13-16 "	16, 17 and 18		.35 "
¾ and 13-16 "	19 and 20		.40 "
¾ and 13-16 "	21		.45 "
¾ and 13-16 "	22		.50 "
¾ and 13-16 "	23		.60 "
11-16, Nos.	13, 14 and 15		.35 "
11-16, "	16, 17 and 18		.40 "
11-16, "	19 and 20		.50 "
11-16, "	21		.60 "
11-16, "	22		.70 "
11-16, "	23		.80 "
⅝, Nos.	13, 14 and 15		.40 "
⅝, "	16, 17 and 18		.45 "
⅝, "	19 and 20		.55 "
⅝, "	21		.65 "
⅝, "	22		.75 "
⅝, "	23		.85 "
9-16, "	13, 14 and 15		.45 "
9-16, "	16, 17 and 18		.50 "
9-16, "	19 and 20		.60 "
9-16, "	21		.70 "
9-16, "	22		.80 "
9-16, "	23		.90 "
½, "	13, 14 and 15		.55 "
½, "	16, 17 and 18		.60 "
½, "	19 and 20		.70 "
½, "	21		.80 "
½, "	22		.90 "
½, "	23		1.00 "
7-16, "	13, 14 and 15		.80 "
7-16, "	16, 17 and 18		.90 "
7-16, "	19 and 20		1.00 "
3⅜, "	13, 14 and 15		1.00 "
3⅜, "	16, 17 and 18		1.10 "
3⅜, "	19 and 20		1.20 "

Sheet Iron.

No. 10	1 50
No. 12	1 70
No. 14	1 80
No. 15-17	1 75
No. 18	1 85
No. 20	2 00
No. 22-24	2
No. 25-26	2 20
No. 27	2 30

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

Steel Boiler Plates—1-4 in. and Heavier.

Tank	1 35
Shell	1 45
Flange	1 55
Marine Flange	1 60
Fire Box	2 05

Above includes plates 90 inches wide.

90 to 96 in. wide	½c. lb. extra
96 to 100 in. wide	1c. "
100 to 104 in. wide	1½c. "
104 to 106 in. wide	special.

Flats.

	cts. lbs.
2 to 9-16 in. wide by 2 to ⅝ thick	08

Bessemer and O. H. Steel.

Bessemer Machinery	base price, 1 40
Open-hearth Tire	" 1 45
Open-hearth Spring	" 1 80
Sleigh Shoe	" 1 45
Toe Calk	" 1 90
Cutter Shoes, tapered and bent	" 1 60

American Cast Tool Steel.

ROUND, SQUARE, AND OCTAGON.	cts. lbs.
1 to 2 in. inclusive	08
9-16 to ⅝ in. "	08
7-16 to ⅜ and 2⅜ to 3 in	09
3⅛ to 4 in	09½
⅝ to 11-16 and 4⅜	10
⅛ to 6 in	10½
¼ to 9-32 and 6⅜ to 7 in	11
1 in	13

Burden Boiler Rivets.

⅛, ⅜, 11-16 and ¾ inches diameter	3 co
Bridge ⅛, ⅜, 11-16 and ¾ inch diam	2 55

Wrought Pipe and Boiler Tubes.

Lap weld black, base, and 10 per cent	78
Butt " " " "	72
Lap " galv. " "	70
Butt " " " "	67
Boiler tubes 2¼" and smaller	72½
Boiler tubes 2½" and larger	75
Casting screw and socket joint	dis. 50
Casing inserted joint	dis. 45

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Magnolia Anti-Friction Metal, 25 cts. per lb., f. o. b. New York or Chicago.

No Name Metal, 18 cts. per lb., f. o. b. New York or Chicago.

Mystic Metal. 8 cts. per lb., f. o. b. New York or Chicago.

Anvils.

American	₩ lb 09@10
Wright's	₩ lb 12

Bellows.

Blacksmiths' { Hill's	dis 40
Blacksmiths' { Bullock's	dis 50&10
Moulders'	dis 40@40&10
Hand	dis 40&10@50

Rivets.

Iron, Thousand, list November 1, 1894.....dis 60@65
Iron, Ordinary, Cooper's Block and Carriage list November 1, 1894.....dis 60@65
Copper.....dis 50@50&10

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list.....dis 10
Machine Screw Taps.....dis 5
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 2
Stove Bolt Taps.....dis 50
Pulley Taps.....dis 40

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 2
Stephen's.....dis 25@3
Barrett's.....dis 5
Miller's Falls.....dis 40
Merrill's.....dis 15@1
Howard.....dis 5

Wire.

New List, Apr. 9, 1894

Brass.....dis 35
Copper.....dis 35
Bright and annealed, Nos. 0@18.....dis 70&10@7
" " Nos. 19@26.....dis 75@75&
" " Nos. 27@36.....dis 75&10&
Coppered Nos. 0 to 18, market list.....dis 70@70&
Galvanized Nos. 0 to 18 " " .....dis65&
Tinned market Nos. 0 to 18.....dis 60
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire regular.....95c ₩ ft dis

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Ar. Buffalo, 7:30 A. M. | Ar. Cleveland, 7:30 A. M.

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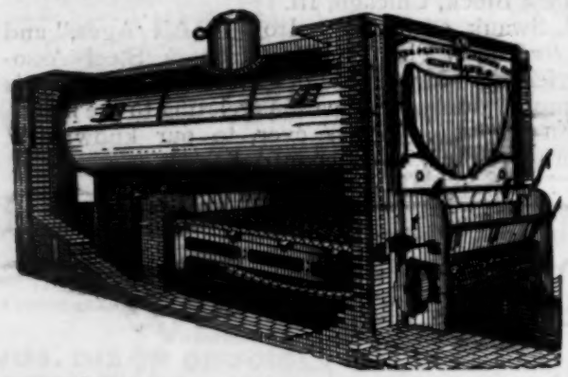

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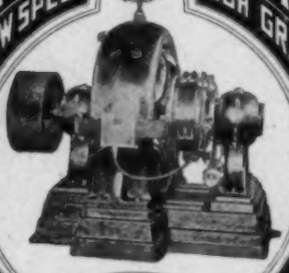

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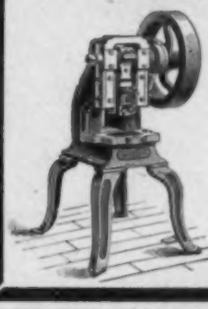

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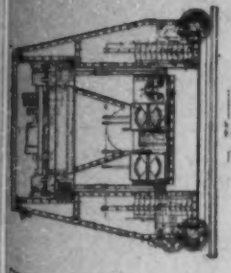

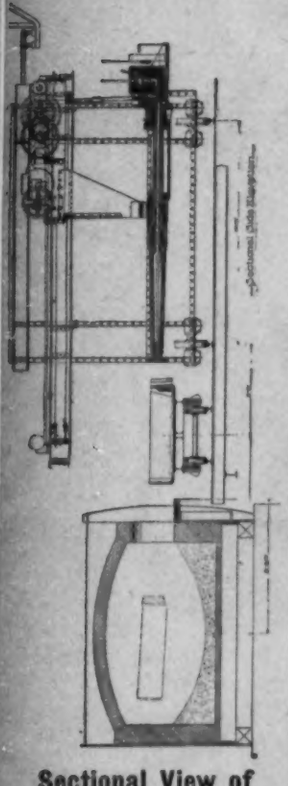

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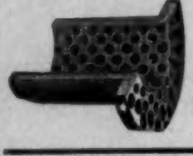

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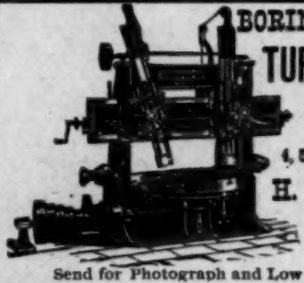

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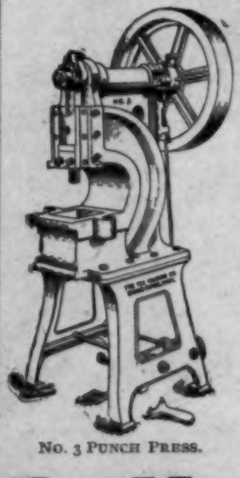

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